OKI

MICROLINE 3320/3321 PRINTER

Product Specifications

Approval

All specifications are subject to change without notice.

CONTENTS

1. INTRODUCTION

The Microline 3320/3321 (ML/Epson/lBM compatible) model printer is a highly reliable, rugged, high performance desk-top serial dot matrix printer, designed for strong, feature-rich paper handling, fast throughput, and user friendliness.

The ML3320 (narrow chassis) is compatible with ML Printer, IBM Proprinter lll, EPSON FX-850, while the ML3321 (wide chassis) is compatible with ML Printer, IBM Proprinter lll XL, EPSON FX-1050.

Feature of the ML3320/3321 compatible printer include:

— 9-pin single arrangement operator replaceable printhead
— Direct access control panel
— Structured direct access menu for easy set up
— Printhead life: 200M characters (average) in 10 CPl Draft mode at normal 25% duty, 35% page density
— Bidirectional short-line-seeking printing
— Print speed: 387 CPS HSD (all CPl's)
290 CPS Utility (all CPl's) SSD 435 CPS (12 CPI Only)
72.5 CPS NLQ (all CPl's)
— Paperfeed : Top/Rear/Bottom path
Bottom path (with optional push/pull tractor)
Built-in rear push tractor
Friction feed with pinch roller release
Optional pull tractor
Optional bottom push tractor
Optional Cut-Sheet Feeder (single bin/dual bin)
— Paper handling : Automatic sheet loading
Short paper tear-off available by menu selection or TEAR switch operation
Auto-loading for single sheet and continuous paper
Auto park feature
— Paper copies: 12 – 24 Ib, 5 part
— Re-inking cartridge ribbon
— Standard Centronics compatible parallel interface and optional RS-232C serial interface
— Quiet operation at 52 dBA in a quiet mode and 57 dBA at a normal mode
— 28 kbytes max. receive buffer
— Line feed resolution at 1/6 inch, 1/8 inch, n/72 inch, n/144 n/144 inch, n/216 simulated by n/288 inch
— Agency approved by CSA, FCC and UL, VDE, BS
— Options: RS-232C Serial Interface
Pull tractor (with acoustic cover)
Bottom push tractor
Cut-Sheet Feeder (CSf)
— Barcode data printing
— Postnet bar code data printing

2. CONFIGURATION

2.1 Standard Printer Configuration

The ML3320/3321 ML/EPSON/IBM

1) Printer mechanism
2) Power & Control board
3) Driver board (including Centronics-compatible Parallel Interface)
4) Operator control panel
5) Power supply
6) Acoustic covers
7) Push tractor feed unit

2.2 Options

1) Interface boards

   RS-232C Serial Interface board (communications rate up to 19.2 K BPS)
2) Push/pull tractor feed with acoustic cover
3) Bottom Push tractor feed
4) Cut-Sheet Feeder

2.3 Block Diagram

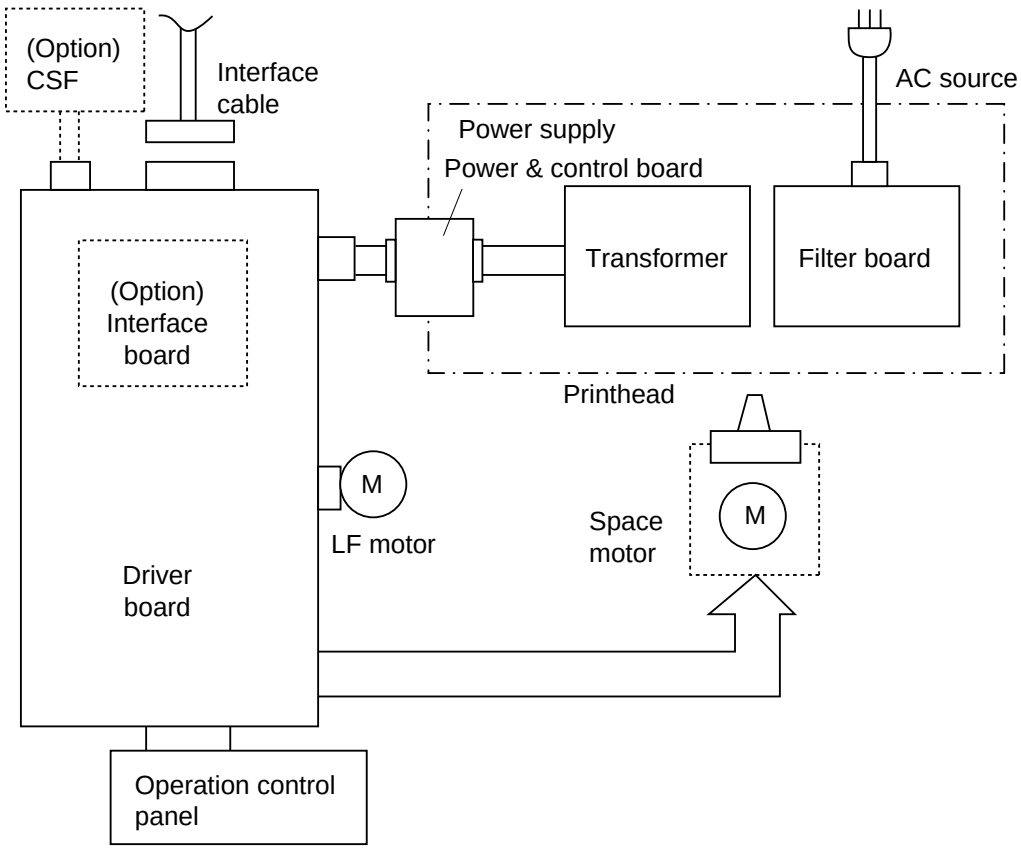


Figure 2-1 Block Diagram

2.4 Initial Setting

Printer Control	Emulation Mode	IBM PPR
Font	Print mode	Utility
	DRAFT mode	HSD
	Pitch	10CPI
	Proportional Spacing	No
	Style	Normal
	Size	Single
Symbol Sets	Character Set	Set 2
	Language Set	ASCII
	Zero Character	Unslashed
	Code Page	USA
	Slashed Letter 0	No
Rear Feed	Line Spacing	6 LPI
	Form Tear-Off	Off
	Skip Over Perforation	No
	Page Width	13.6"
	Page Length	12"
Bottom Feed	Line Spacing	6 LPI
	Form Tear-Off	Off
	Skip Over Perforation	No
	Page Width	13.6"
	Page Length	12"
Top Feed	Line Spacing	6 LPI
	Form Tear-Off	Off
	Bottom Margin	Valid
	Page Width	13.6"
	Page Length	11 2/3"
	Wait Time	1 sec
	Page Length Control	by Actual Page Length
Set-Up	Graphics	Bi-directional
	7 or 8 Bits Graphics	7
	Receive Buffer Size	16K
	Paper Out Override	No
	Print Registration	0
	7 or 8 Bits Data Word	8
	Operator Panel Function	Full Operation
	Reset Inhibit	No
	Print Suppress Effective	Yes
	Auto LF	No
	Auto CR	No
	CSF Bin Select	Bin 1
	Print DEL Code	No
	Sl Select Pitch (10CPI)	17.1 CPI
	Sl Select Pitch (12CPI)	12 CPI
	Time Out Print	Valid
	Auto Select	No
	Centering Position	DEFAULT
	CSF Type	Wide
Parallel I/F	I-Prime	Buffer Print
	Pin 18	+ 5V
	Auto Feed XT	Invalid

Serial I/F	Parity Serial Data 7/8 Bits Protocol Diagnostic Text Busy Line Baud Rate DSR Signal DTR Signal Busy Time	None 8 Bits Ready/Busy No SSD- 9600 BPS Valid Ready on Power Up 200 ms
CSF Bin 1	Line Spacing Bottom Margin Page Width Page Length	6 LPI Valid 13.6" 11 2/3"
CSF Bin 2	Line Spacing Bottom Margin Page Length	6 LPI Valid 11 2/3"

3. GENERAL SPECIFICATIONS

3.1 Power Requirements

1) Input power

Single-phase AC

Voltage: 120 VAC +5.5%, –15%

230/240 VAC +10%, –14%

Frequency: 50/60Hz +2%

2) Power consumption

Local Test: About 70 VA

Idle: About 41 VA

3) AC power cable

Length: Approximately 5.9 ft (1.8 m)

Cable conforms to the UL, CSA, and European Standards.
The AC power cable can be easily disconnected from the printer. The desired printer operating voltage and the corresponding power cable should be specified when ordering the printer.

3.2 Electric Insulation

1) Insulation resistance

5 megohms or more when measured between AC input line and frame using 500-VDC megohmmeter.

2) Dielectric strength

120Vmodel: 1,250 VAC (50 Hz)

230/240V model: 1,500 VAC (50 Hz)

(No damage will result when the above voltage is applied between the AC input line and frame for 1 minute.)

3.3 Environmental Conditions

1) Ambient temperature and relative humidity

	Operating	Non-operating	Transportation	Storage	Unit
Temperature	41 to 104 (5 to 40)	32 to 109.4 (–0 to 43)	–40 to 158 (–40 to 70)	14 to 122 (–10 to 50)	°F (°C)
Relative Humidity	20 to 80	10 to 90	5 to 95	5 to 95	% RH

Avoid condensation at all times.

2) Vibration

Operating: 0.3G (5 to 150 Hz) or less (except at resonant frequency)

Non-operating: 1G (5 to 150 Hz) or less (except at resonant frequency)

Packing: 1.05G (5 to 150 Hz) or less (except at resonant frequency)

3) Impact (Drop Test)

Packing: 30" Drop

4) Noise

The 8-second average noise is less than 57 dBA when measured under the above conditions with the printer fitted with the acoustic cover and 52 dBA in quiet mode. (ISO 7779)

3.4 Agency Approvals

UL No.: The printer is listed in UL STANDARD No. 1950.

CSA No.: CSA certification to CSA STANDARD 22.2-950.

FCC: FCC certified per Part 15, CLASS B.

VDE: VDE 0805 VDE 0875 class B.

IEC: IEC 950

BS: BS 7002
EN 55022 Class B (CE mark)

3.5 Communication Interface Specifications

A. Centronics-compatible Parallel Interface

1) Connectors and cable

(a) Connectors

Printer side: 36-pin receptacle 57RE-40360-730B-D29A6 (Daiichi Electronics) or equivalent

Cable side: 36-pin plug 57-30360 (Amphenol or Daiichi Electronics) or equivalent, or plug 552274-1 (Amphenol) cover 552073-1 (Amphenol) or equivalent

(b) Cable

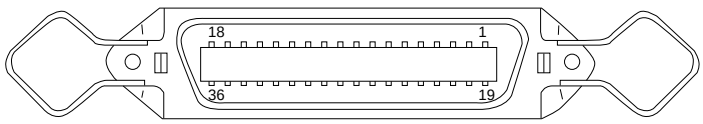
Use cable less than 6 ft (1.8 m) in overall length. (A shielded cable is required, and use of twisted-pair wires is recommended for noise prevention.)

Note: Interface cable is not supplied.

2) Parallel interface signals

Pin No.	Signal	Direction	Description
1	DATA STOROBE	To printer	Sample input data when changing from low level to high level.
2	DATA BIT 1	To printer	Input data: High level indicates " 1 " and low level
3	DATA BIT2		
4	DATA BIT3		
5	DATA BIT4		
6	DATA BIT5		
7	DATA BIT6		
8	DATA BIT7		
9	DATA BIT8		
10	ACKNOWLEDGE	From printer	Indicates character input completion, or function operation end, at low level.
11	BUSY	From printer	Indicates data cannot be received at high level. Data can be input at low level.
12	PAPER END	From printer	High level indicates paper end.
13	SELECT	From printer	High level indicates select (online) condition.
14	AUTO FEED	To printer	When "Auto Feed" in the menu is set as valid under EPSON mode, this signal goes to the low level and the printer generates a line feed after receiving CR code.
16, 33	0V	—	Signal ground.
17	CHASSIS GROUND	—	Frame ground.
18	+ 5V	From printer	+5V supply (50 mA maximum) +5V on/off is selectable by MENU.
19 to 30	0V	—	Twisted pair return (for pin No. 1 to 11)
31	INPUT-PRIME	To printer	When this signal goes to the low level, printer controller is initialized. The low level should be held for more than 0.5 ms.
32	FAULT	From printer	This signal goes from high to low level when paper runs out. (Possible to indicate error and OFF-Line state).
15, 34	—	—	Unused
35	—	—	Fixed to High (Connected to +5V thru 3.3K)
36	(Select-In)	To printer	In the EPSON mode, when menu item "Print Suppress Effective" is Yes, and the Select-In signal is high, the DC1/DC3 code is valid, and invalid when the signal is low.

Note: Pin arrangement

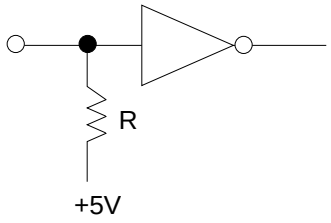


3) Parallel interface levels

High level:	Driver:	+ 2.4V to + 5V
	Receiver:	+ 2.0V to + 5V
Low level:	Driver:	0V to + .4V
	Receiver:	0V to + .8V

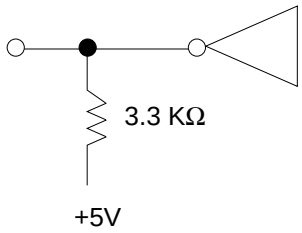
4) Parallel Interface circuits

(a) Receiver

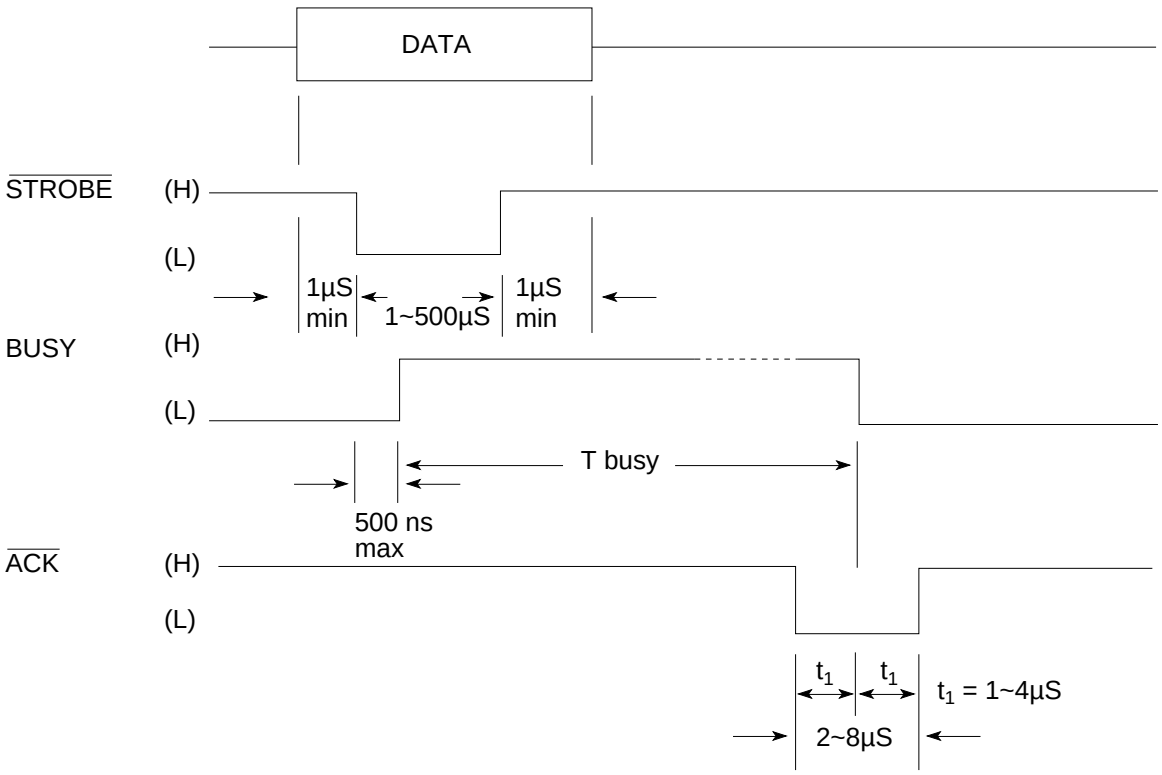


R = 3.3 KΩ (Data 1 to Data 8)
R = 1 KΩ ($\overline{\text{I-PRIME}}$)
R = KΩ ($\overline{\text{STB}}$) (USA)

(b) Driver



5) Parallel Interface timing chart



4. PHYSICAL CHARACTERISTICS

4. 1 Printhead

Print method: Impact dot matrix

Number of dot wires: 9

Dot wire diameter: 0.013 inch (0.34 mm)

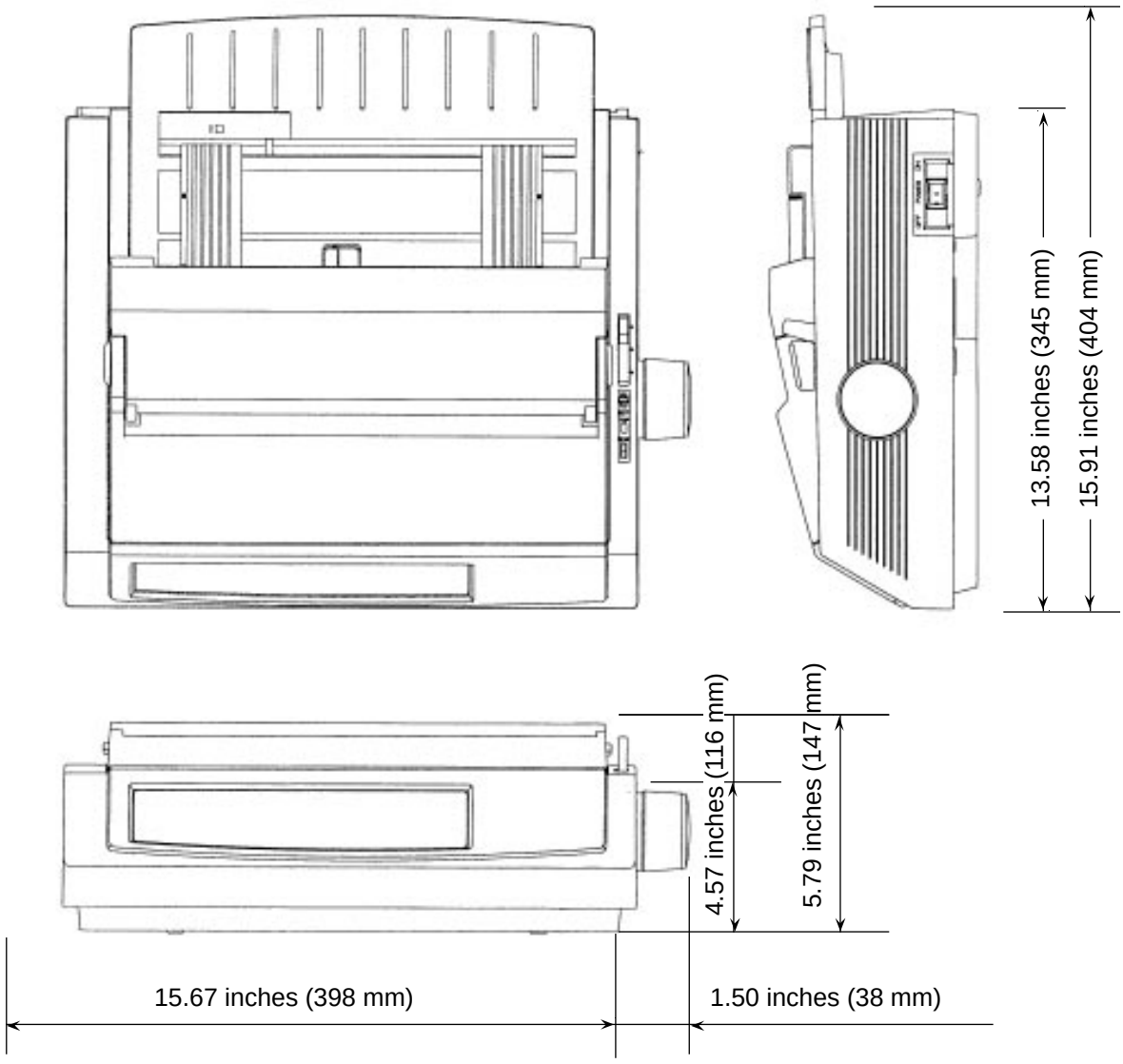
4.2 Printer

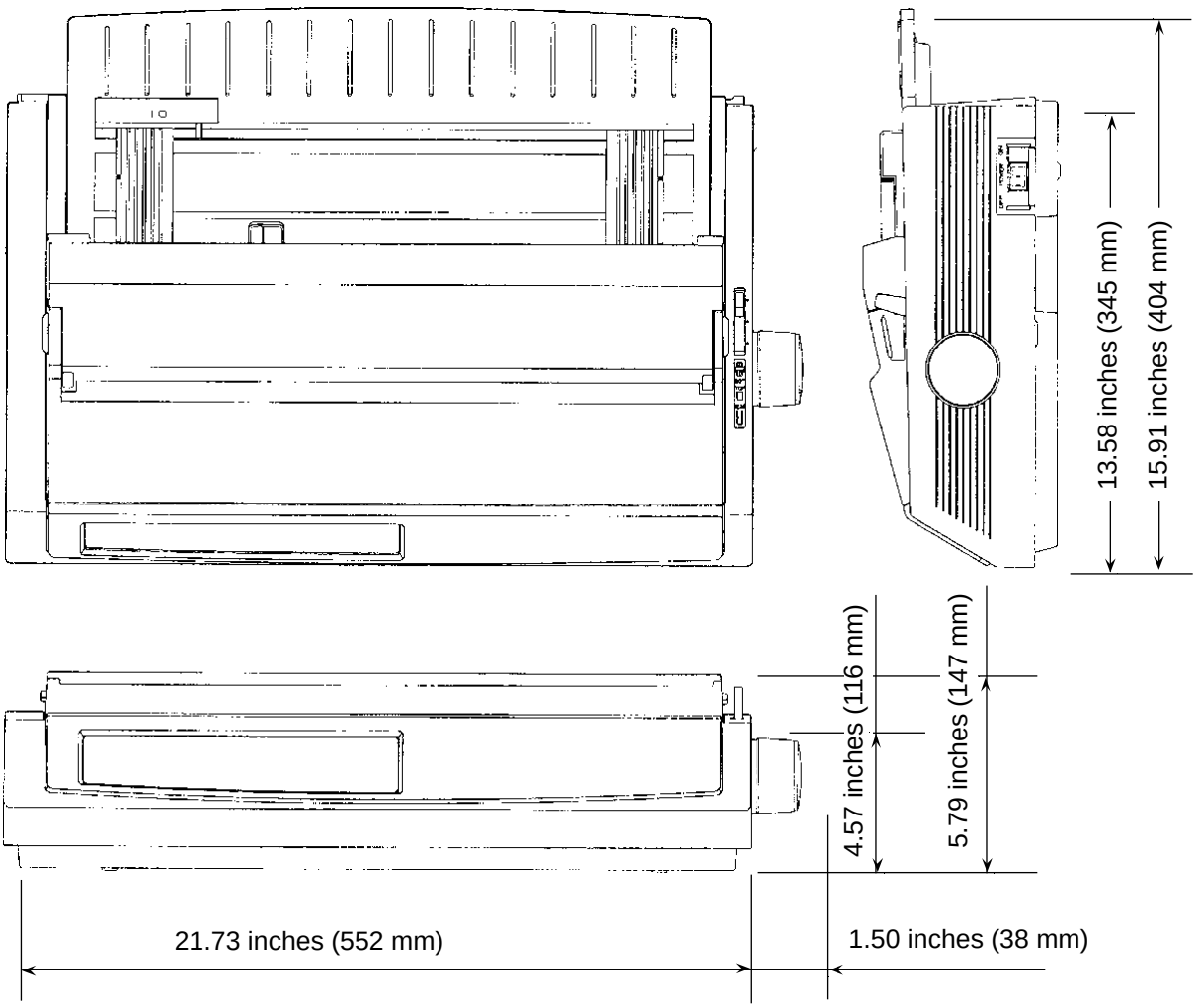
1) Outside dimensions

ML320 Turbo: 15.67 inches (398 mm) (W) × 4.57 inches (116 mm) (H) × 13.58 inches (345 mm) (D)

ML321 Turbo: 21.73 inches (552 mm) (W) × 4.57 inches (116 mm) (H) × 13.58 inches (345 mm) (D)

These dimensions do not include the platen knob, acoustic cover and paper separator.





ML3321

2) Weight

   ML3320 Turbo: 14.33 lb (6.5 kg)

   ML3321 Turbo: 18.74 lb (8.5 kg)

3) Color and texture

   Color: 3.5Y8/0.5

   Texture: TH114

4.3 Options

(1) Interface board

RS-232C serial interface board (communications rate up to 19.2 KBPS)

(2) Tractor feed unit with acoustic cover for Pull Feed or Bi-directional

(3) Bottom push tractor feed unit for Bottom push feed

(4) Cut-Sheet Feeder (Single bin/Dual bin)

5. LOGICAL CHARACTERISTICS

5.1 Print Direction

Bidirectional, unidirectional printing

Short-line-seeking printing

5.2 Selectable Character Pitches

5 CPI	6 CPI	7.5 CPI	8.5 CPI	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
0.2 inch (5.08 mm)	0.167 inch (4.23 mm)	0.133 inch (3.39 mm)	0.117 inch (2.96 mm)	0.1 inch (2.54 mm)	0.083 inch (2.12 mm)	0.067 inch (1.69 mm)	0.058 inch (1.48 mm)	0.05 inch (1.27 mm)

5.3 Maximum Number of Dot Columns per Line

1) Graphics

	Single Density	Double Density	Quadruple Density
ML3320	480	960	1,920
ML3321	816	1,632	3,264

2) Text

Model		Print Mode	Character Pitch (CPI)				
			10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML3320	ML, EPSON, IBM	UTILITY	960	1,152	1,440	1,646	1,920
ML3321			1,632	1,958	2,448	2,798	3,264
ML3320	ML, EPSON, IBM	NLQ	1,920	2,304	2,880	3,292	3,840
ML3321			3,264	3,917	4,896	5,596	6,528
ML3320	ML, EPSON, IBM	HSD	720	864	1,080	1,234	1,440
ML3321			1,224	1,468	1,836	2,098	2,448
ML3320	ML, EPSON, IBM	SSD		768			
ML3321				1,305			

5.4 Maximun Number of Character per Line

Character Pitch (CPI)			5	6	7.5	8.5	10	12	15	17.1	20
Mode	ML3320	ML EPSON IBM	40	48	60	68	80	96	120	137	160
	ML3321		68	81	102	116	136	163	204	233	272

5.5 Line Feed Pitches

6 LPI 0.167 inch (4.23 mm)

8 LPI 0.125 inch (3.175 mm)

A variable line feed pitch of n/216 inch (integer n: $0 \leq n \leq 255$) can also be specified. Also, 7/72 inch and n/72 inch can be specified.

PROPRINTER n: $1 \leq n \leq 255$

EPSON n: $1 \leq n \leq 255$ (Cannot specify MSB: $1 \leq n \leq 127$)

6. PRINTER PERFORMANCE

6.1 Print Speed

Print Mode	Character Pitch				
	10 CPI	12 CPI	15 CPI	17. 1 CPI	20 CPI
HSD	387 CPS	387 CPS	387 CPS	387 CPS	387 CPS
NLQ	72.5 CPS	72.5 CPS	72.5 CPS	72.5 CPS	72.5 CPS
UTILITY	290 CPS	290 CPS	290 CPS	290 CPS	290 CPS
SSD	—	435 CPS	—	—	—

6.2 Throughput (Lines per Minute)

1) High speed draft mode

Model	Characters/Line	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML3321	136	127	—	—	—	—
	163	—	112	—	—	—
	204	—	—	93	—	—
	233	—	—	—	84	—
	272	—	—	—	—	73
ML3320	80	191	—	—	—	—
	96	—	171	—	—	—
	120	—	—	146	—	—
	137	—	—	—	132	—
	160	—	—	—	—	117

2) Utility mode

Model	Characters/Line	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML3321	136	104	—	—	—	—
	163	—	90	—	—	—
	204	—	—	74	—	—
	233	—	—	—	65	—
	272	—	—	—	—	57
ML3320	80	161	—	—	—	—
	96	—	141	—	—	—
	120	—	—	118	—	—
	137	—	—	—	106	—
	160	—	—	—	—	92

3) Near letter quality mode

Model	Characters/Line	Characater Pitch				
		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML3321	136	29	—	—	—	—
	163	—	24	—	—	—
	204	—	—	19	—	—
	233	—	—	—	17	—
	272	—	—	—	—	15
ML3320	80	48	—	—	—	—
	96	—	40	—	—	—
	120	—	—	32	—	—
	137	—	—	—	28	—
	160	—	—	—	—	25

4) Super speed draft mode

Model	Characters/Line	Characater Pitch				
		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML3321	136	—	122	—	—	—
ML3320	96	—	184	—	—	—

The above table specifies the print speeds at a line feed pitch of 6 LPI in the normal print mode.

6.3 Line Feed Speed

6 LPI spacing, one LF = 65 ms

8 LPI spacing, one LF = 60 ms

Continuous paper feed rate is at 4.5 inches per second.

7. MEDIA SPECIFICATIONS

7.1 Cut-Sheet Paper

Standard size: 8-1/2 inches (wide) × 11 inches (long) for the U.S. A4 size (210mm (wide) × 297 mm (long)) for Europe

Weight: 12 to 24 lb (45 to 90 g/m^2)
Multiple-part cut-sheet paper cannot be used.

7.2 Continuous Paper

Tractor feed unit can handle sprocket paper of the following widths:

ML3320 : 3 to 10 inches (76.2 to 254 mm)

ML3321 : 3 to 16 inches (76.2 to 406.4 mm)

One-part paper

Ream weight: 12 to 24 lb (45 to 90 g/m^2)

Multiple-part paper: 0.014 inch (0.356 mm) or less total thickness
0. 017 inch (0.44 mm) or less total thickness (bottom path only)

		Ream Weight	Number of Sheets
Carbon-lined paper		9 to 11 lb	Up to 5
Pressure-sensitive paper		(35 to 40 g/m^2)	including original
Interleaf paper	PAPER	10 lb to 12 lb (38 to 45 g/m^2)	Up to 5 including original
	CARBON	9 lb (34 g/m^2)	

Multiple-part paper should be fastened by spot-pasting or crimping on both sides, and should be free of wrinkles.

7.3 Cut Form Envelope

Weight: 24 lb (90 g/m^2) or l ess

Thickness: 0.0 16 inch (0.41 mm or less)

6-1/2 × 3-5/8 inches

8-7/8 × 3-7/8 inches

9-1/2 × 4-1/8 inches

7.4 Continuous Envelope

Weight: 24 lb (90 g/m^2) or less

Thickness: 0.014 inch (0.36 mm or less)

Width: 3 – 10 inches (76.2 – 254 mm)

Media supply: Bottom paper feed only

7.5 Card

Weight:	120 Ib (163 g/m^2) or less
Thickness:	0.008 inch (0.20 mm) or less
Size:	5 × 8 inches (separated)
Media supply:	Bottom paper feed only

7.6 Label

Thickness:	0.011 inch (0.28 mm) or less
Size:	ML3320 -8.5 × 3.25 inches(216 × 83 mm) or less
	ML3321 -15 × 3.25 inches (381 × 83 mm) or less
Media supply:	Bottom paper feed only

7.7 Transparency

Thickness:	0.004 inch (0.10 mm) or less
Size:	8.5 × 11 inches (216 × 280 mm) or less

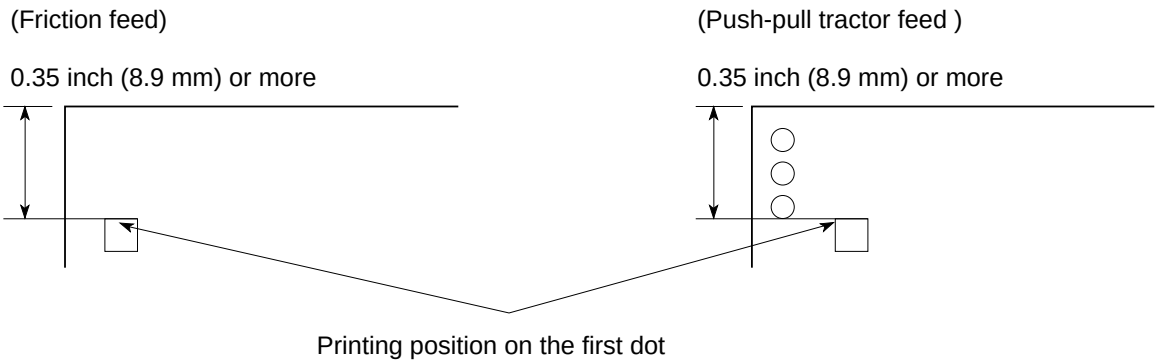
8. PAPER FEED SPECIFICATIONS

8.1 Paper Feed Methods/Paths

When the friction feed method is used, the paper must be fed from rear.

	ML3320	ML3321
(a) Friction feed (Top path)	For cut-sheet paper only	For cut-sheet paper only
(b) Push tractor feed (Rear path)	For continuous forms	For continuous forms
(c) Push-pull-traction paper feed (option)	For continuous forms	For continuous forms
(d) Pull tractor feed (Bottom path) (option)	For continuous forms	For continuous forms
(e) Bottom push tractor feed (option)	For continuous forms	For continuous forms

8.2 Paper Positioning Restrictions



8.3 Paper Tear-off

The paper can be torn off 0.42 inch above the first printed line. A sharp serrated edge is provided on the access cover for paper tear-off.

8.4 Automatic Sheet Loading

With top paper feed, cut-sheets can be automatically loaded by setting paper at the top feed position.

8.5 Paper End Detection

(1) With rear paper feed, the paper end is detected when the remaining paper length is about 1 inch (25.4 mm) from the last printed line.

(2) With bottom paper feed, the paper end is detected when the remaining paper length is about 1 inch (25.4 mm) from the last printed line.

(3) Upon detecting the paper end, the printer stops printing and sends a paper end signal to the interface.

(4) A paper end override function is available to allow printing to be performed line-by-line under operator control after the paper end has been detected. (rear, and bottom)

9. RIBBON SPECIFICATIONS

Genuine OKI cartridge ribbon

Ink color: Black

Ribbon life: Approximately 3 million characters (Re-inking cartridge)

10. RELIABILITY

1) MTBF (mean time between failures)

   10,000 hours of power-on time

   Page density: 35%

   Duty cycle: 25%

2) Printhead life

   200 million characters (average) in 10 CPI Draft print quality

   Page density: 35%

   Duty cycle: 25%

3) Printer life

   12,000 hours of power-on time

   Page density: 35%

   Duty cycle: 25%

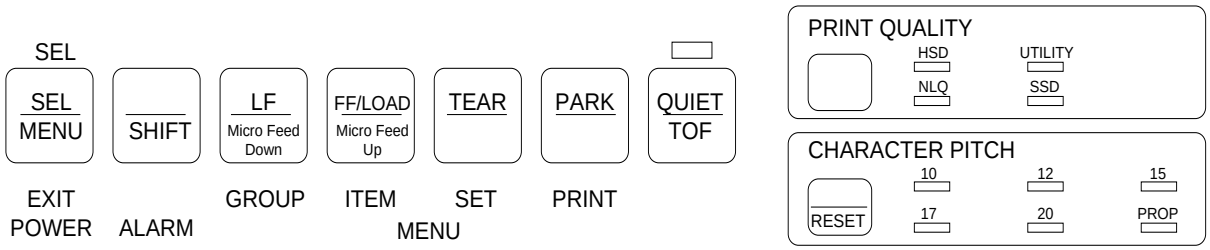
4) MTTR

   15 minutes Major Sub-assembly level

11. OPERATOR CONTROL

11.1 Operator Control Switches and Indicator Lights

Locations of Switches and Indicator Lights
ML3320/3321 OPERATOR PANEL



11.2 Switch Functions

The functions of the switches on the operator panel depend on the state of the printer. Each function is described in the following table.

The Functions of Switches (1/2) (Without pressing the SHIFT switch) (1/2)

MODE / SW	Print Mode		Hex Dump Mode		Menu Mode	Test Mode	Power On Mode	Limited Operation Mode
	Select	Deselect	Select	Deselect				
SEL/ MENU	Sets printer off line.	Sets printer on line.	Sets printer off line.	Sets printer on line.	Clears MENU PAPER END.	Ends TEST mode.	Starts MENU mode.	Enabled.
SHIFT								Enabled.
LF/Micro Feed Down	Performs line feed. *1, 2				Selects next Group.		Starts Self-test.	Enabled.
FF/LOAD/ Micro Feed Up	• When paper is set: — If cut-sheet paper is used, the paper is ejected. — If fan fold paper is used, the printer feeds paper up to the next TOF position. • When no paper is set while printer status is "deselect," the printer loads paper.				Selects next Item. *3			Enabled.

The Functions of Switches (1/2) (While pressing the SHIFTswitch) (2/2)

MODE / SW	Print Mode		Hex Dump Mode		Menu Mode	Test Mode	Power On Mode	Limited Operation Mode
	Select	Deselect	Select	Deselect				
TEAR	Feeds paper to tear or print position (alternating)				Selects next Setting.			Enabled.
PARK	Cut-sheet paper: Printer ejects paper. Fan fold paper: Printer reverse feeds paper.				Prints all items.			Enabled.
QUIET/ TOF	Selects/ends QUIET mode.						Starts Rolling ASCII Self-test.	
CHARAC-TER PITCH	Selects character pitch.							
PRINT QUALITY	Selects PRINT mode.							
FF/LOAD+ TEAR							Resets to the default menu and paper load position.	
SEL+LF							Resets to the default features in MENU mode.	
QUIET+ PARK							Resets to the default paper load position.	
SEL+ FF/LOAD							Starts Hex-dump mode.	
SEL+ QUIET					Sets fixed menu or header values (stored in ROM). Resets to the default suction position.			
SEL+ TEAR					Starts Menu Maintenance Mode.			
SEL+ PARK					Clears frequency-of-printer-use data.			

*1: When no CSF mode paper is set, the printer loads paper.

*2: When the LF/Micro Feed Down switch is pressed for 400ms or more, the printer performs a continuous LF operation.

*3: When no paper is set, the printer loads paper.

Note: The blanks in the above table denote no operation.

The Functions of Switches (2/2) (Without pressing the SHIFTswitch)

MODE / SW	Print Mode		Hex Dump Mode		Menu Mode	Test Mode	Power On Mode	Limited Operation Mode
	Select	Deselect	Select	Deselect				
SEL/ MENU	SETS MENU MODE.				Ends MENU mode.		Starts MENU mode.	
SHIFT								Enabled.
LF/Micro Feed Down		Executes Reverse Fine LF.		Executes Reverse Fine LF.	Select previous Item.		Starts Self-test.	Enabled.
FF/LOAD/ Micro Feed Up		Executes Forward Fine LF.		Executes Forward Fine LF.	Select previous Group.			Enabled.
TEAR	Execute Back-ward vertical paper feed				Select previous Setting.			Enabled.
PARK	Execute vertical paper feed.				Prints Group items.			
QUIET/TOF		Sets TOF. *4		Sets TOF. *4			Starts Rolling ASCII Self-test.	
CHARAC-TER PITCH		Resets printer.		Resets printer.				
PRINT QUALITY	Select/deselect incrimental print mode.				Prints all items. (All)			
FF/LOAD+ TEAR							Resets to the default menu and paper load position.	
SEL+LF							Resets to the default features in MENU mode.	
QUIET+ PARK							Resets to the default paper load position.	
SEL+ FF/LOAD							Starts Hex-dump mode.	
SEL+ QUIET					Sets fixed menu or header values (stored in ROM). Resets to the default suction position.			
SEL+TEAR					Starts Menu Maintenance Mode.			
SEL+PARK					Clears frequency-of-printer-use data.			

*4: When no paper is set, the printer load position is set to factory default.

Note: The blanks in the above table denote no operation.

11.3 Indicator Light Functions

11.3.1 Primary Functions

Lamp	Color	Function
SEL	Amber	Lights when the printer enters the select state, and starts blinking when the printer enters the print suppress mode.
ALARM	Red	Lights when paper end is detected or when malfunction is detected.
POWER	Amber	Lights when power is turned on.
MENU	Amber	Lights to indicate MENU mode and flashes to indicates when the head, LF motor, or SP motor is in thermal alarm.
QUIET	Amber	Lights to indicate quiet print mode selected.
HSD	Amber	Lights when printing in the High Speed Draft mode.
UTL	Amber	Lights when printing in the UTILITY mode.
NLQ	Amber	Lights when printing in the Near Letter Quality mode.
SSD	Amber	Lights when printing SSD mode
10 CPI	Amber	Lights when printing in the 10 CPI character pitch.
12 CPI	Amber	Lights when printing in the 12 CPI character pitch.
15 CPI	Amber	Lights when printing in the 15 CPI character pitch.
17 CPI	Amber	Lights when printing in the 17.1 CPI character pitch. *
20 CPI	Amber	Lights when printing in the 20 CPI character pitch. *
PROP	Amber	Lights when printing in the proportional mode.

11.3.2 Secondary Functions

When MENU is reset to factory defaults (SEL + LF + PWR-UP), the 10 CPI, 12 CPI, and 15CPI LEDs will light momentarily. When the paper load position is reset (QUIET + PARK + PWR-UP), the 17 CPI, 20 CPI, and PROP LEDs will light momentarily. Pressing the FF and TEAR keys simultaneously while powering on the printer will reset the MENU settings and paper load position to their factory defaults. At this time, all CPI LEDs will light.

11.4 Alarm/Error Indications

The following table summarizes LED indications during alarm states.

11.4.1 Recoverable Alarms

LED / Alarm	Alarm	Menu	SEL	Quiet	10CPI	12CPI	15CPI	17CPI	20CPI	PROP	HSD	UTILITY	NLQ	SSD
Paper End	◯													
Paper Lever	◯				☆									
Paper Jam*	◯						☆							
Head Tmp.		☆												
SPACE & LF Motor Tmp.		☆												

*Note: Paper jam alarm
- o Paper jam
- o Loading paper jam
- o Ejecting paper jam
- o Reverse feed paper jam

◯ : LED turns ON.
◎ : LED flashes (200ms ON, 200ms OFF).
☆ : LED flashes (400ms ON, 400ms OFF).
▭ : LED maintains current state.
Blank : LED turns OFF.

• Fatal alarms

LED / Alarm	Alarm	Menu	SEL	Queit	10CPI	12CPI	15CPI	17CPI	20CPI	PROP	HSD	UTILITY	NLQ	SSD
Fatal alarms														
Printer internal RAM	◎				○									
S-I/F internal RAM	◎				○						○			
S-I/F internal connection	◎					○					○			
PRG ROM	◎						○							
S-I/F ROM	◎						○				○			
EEROM	◎						○						○	
WDT	◎							○						
NMI	◎							○			○			
BRK instruction	◎							○				○		
Printer external RAM	◎								○					
S-I/F external RAM	◎								○		○			
SPACING	◎				○					○	○			
HOMING	◎				○					○		○		
Print Head A/D error	◎				○				○					
Print Head Gap AD error	◎				○				○		○			

○ : LED turns ON.
◎ : LED flashes (200ms ON, 200ms OFF).
☆ : LED flashes (400ms ON, 400ms OFF).
▭ : LED maintains current state.
Blank : LED turns OFF.

11.5 Secondary Switch Functions

11.5.1 MENU

1) Overview

Features selected in MENU mode become the default features for the printer each time it is powered on. The Menu function allows the ability to activate features without the use of software commands. Software commands will override MENU settings.

2) Key functions

Key Name	Function
GROUP	General categorization of functions/features. Selects next GROUP title, once through the entire list, loops back to the first GROUP. Also, upon first entering MENU, causes the first line of MENU to be printed.
ITEM	Direct name of functions/features. Selects next ITEM title, once through the entire list, loops back to the first ITEM in the current GROUP. Also, upon first entering MENU, causes the first line of MENU to be printed.
SET	Value (setting) of the ITEM. Selects next SETTING value, once through the entire list, loops back to the beginning of the list. Also, upon first entering MENU, causes the first line of MENU to be printed.
PRINT	Prints entire MENU and loops back to the beginning of MENU.

Note: Pressing these keys while the SHIFT key is pressed, selects the items in reverse order.

3) Operation description

(a) To enter Menu mode, depress SHIFT + MENU switch.

1. MENU mode LED = on
2. printer = deselected state
3. SEL LED = off

(b) Upon entering Menu mode, press the GROUP key, ITEM key, or SET key to print the first line of MENU. Press the PRINT key to print the whole MENU.

(c) See Key functions above for description of operation within Menu mode.

(d) To exit MENU mode, press the SHIFT + MENU.

(e) If conflicting features/functions are set in menu mode, the printer will treat these function/features according to the priority table.

(f) The TOF position is not affected by MENU mode. (When the page length is changed, be sure to set the TOF.)

(g) Depressing the FF and TEAR keys or the SEL and LF keys simultaneously while powering on the printer will reset the menu back to its factory defaults. (See FACTORY SETTINGS for further details.)

(h) If the Operator Panel is set to “Limited Operation”, press the SHIFT + MENU switch during power-up in order to enter MENU.

Note: When first entering Menu mode, the user is not prompted “MENU PRINT” or upon exiting the user in not prompted “MENU END”.

4) Table of all menu choices

* Factory default

Group	Item	Sets
Printer Control	Emulation Mode	IBM PPR * Epson FX ML
Font	Print Mode	Utility * NLQ Courier NLQ Gothic DRAFT
	DRAFT Mode	HSD* SSD
	Pitch	10CPI* 12 CPI 15 CPI 17.1 CPI 20 CPI
	Proportional Spacing	No* Yes
	Style	Normal* Italics
	Size 1)	Single* Double
Symbol Sets	Character Set	Set I Set II* Standard, Line Graphics, Block Graphics (ML Mode only)
	Language Set	ASCII* French German British Danish I Swedish Italian Spanish I Japanese Norwegian Danish II Spanish II Latin American French Canadian Dutch TRS80 Swedish II Swedish III Swedish IV Turkish Swiss I Swiss II Publisher
	Zero Character	Slashed Unslashed*

* Factory default

Group	Item	Sets
Symbol Sets	Code Page	USA* Canada French Multilingual Portugal Norway
	Slashed Letter 0 No* Yes	Turkey Greek_437 Greek_869 Greek_928 Greek_437 CYPRUS Polska Mazovia Serbo Croatic I Serbo Croatic II ECMA-94 Hungarian CWI Windows Greek Windows East Europe Windows Cyrillic East Europe Latin II-852 Cyrillic I-855 Cyrillic II-866 Kamenicky (MJK) ISO Latin 2 Hebrew NC (862) Hebrew OC Turkey_857 Latin 5 (Windows Turkey) Windows Hebrew Ukrainian Bulgarian ISO Latin 6 (8859/10) Windows Baltic Baltic_774
Rear Feed	Line Spacing	6 LPI* 8 LPI
	Form Tear-Off 5)	Off* 500ms 1 sec 2 sec
	Skip Over Perforation	No* Yes
	Page Width 4)	13.6" * 8"

* Factory default

Group	Item	Sets
Rear Feed	Page Length	11" 11 2/3" 12" * 14" 17" 3" 3.5" 4" 5.5" 6" 7" 8" 8.5"
Bottom Feed	Line Spacing	6 LPI * 8 LPI
	Form Tear-Off 5)	Off * 500ms 1 sec 2 sec
	Skip Over Perforation	No * Yes
	Page Width 4)	13.6" * 8"
	Page Length	11" 11 2/3" 12" * 14" 17" 3" 3.5" 4" 5.5" 6" 7" 8" 8.5"
Top Feed	Line Spacing	6 LPI* 8 LPI
	Form Tear-Off 5) 6)	Off * 500ms 1 sec 2 sec
	Bottom Margin	Valid * Invalid
	Page Width 4)	13.6" * 8"
	Page Length	11" 11 2/3" * 12" 14" 17" 3" 3.5" 4" 5.5" 6" 7" 8" 8.5"

* Factory default

Group	Item	Sets
Top Feed	Wait Time	500ms 1 sec * 2 sec
	Page Length Control	by Actual Page Length * by Menu Setting
Set-Up	Graphics	Bi-directional * Uni-directional
	7 or 8 Bits Graphics 7)	8 7 *
	Receive Buffer Size 2)	1 Line 16K * 28K
	Paper Out Override	No * Yes
	Print Registration	0.25 mm Right 0.20 mm Right 0.15 mm Right 0.10 mm Right 0.05 mm Right 0 * 0.05 mm Left 0.10 mm Left 0.15 mm Left 0.20 mm Left 0.25 mm Left
	7 or 8 Bits Data Word	8 *, 7
	Operator Panel Function 3)	Full Operation * Limited Operation
	Reset Inhibit	No * Yes
	Print Suppress Effective	No Yes *
	Auto LF	No * Yes
	Auto CR 8)	No * Yes
	CSF Bin Select 9)	Bin 1 * Bin 2
	Print DEL Code 7)	No * Yes
	Sl Select Pitch (10 CPI) 8)	15 CPI 17.1 CPI *
	Sl Select Pitch (12 CPI) 8)	12 CPI * 20 CPI
	Time Out Print	Valid * Invalid
	Auto Select	No * Yes
	Centering Position	DEFAULT *, MODE1, MODE2
	CSF Type	Wide *, Narrow

* Factory default

Group	Item	Sets
Parallel I/F	I-Prime	Invalid Buffer Print * Buffer Clear
	Pin 18	+ 5V * Open
	Auto Feed XT 10)	Valid Invalid *
Serial I/F	Parity	None * Odd Even
	Serial Data 7/8 Bits	8 Bits * 7 Bits
	Protocol	ReadylBusy * X-ON/X-OFF
	Diagnostic Test	No * Yes
	BusyLine	SSD – * SSD + DTR R TS
	Baud Rate	9600 BPS * 4800 BPS 2400 BPS 1200 BPS 600 BPS 300 BPS 38400 BPS 12) 19200 BPS
	DSR Signal	Valid * Invalid
	DTR Signal	Ready on Power Up * Ready on Select
	Busy Time	200 ms * 1 sec
CSF Bin 2 (Selectable only when the double bin CSF is mounted)	Line Spacing	6 LPI * 8 LPI
	Bottom Margin	Valid * Invalid
	Page Length	11" 11 2/3" * 12" 14" 16.57" 3.5" 4" 5.5" 6" 7" 8" 8.5"

* Factory default

Group	Item	Sets
CSF Bin 1	Line Spacing	6 LPI * 8 LPI
	Bottom Margin	Valid * Invalid
	Page Width 4) 11)	13.6" * 8"
	Page Length	11" 11 2/3" * 12" 14" 16.57" 3.5" 4" 5.5" 6" 7" 8" 8.5"

Notes: 1) Selects both double width and double height characters OR single width and single height characters.

2) When “I Line” is selected, the receiving buffer size is set to 256 bytes.

3) When “Limited Operation” is selected, after exiting MENU, only the SEL, LF, FF, and TEAR switches are valid. PRINT QUALITY, PITCH, PARK, and TOF/ Quiet are invalid. This means that MENU mode will not be able to be accessed via the SHIFT + MENU switch. In order to enter MENU, when the Operator Panel is set to “Limited Operation”, depress the SHIFT + MENU switch while powering on the printer. Once in MENU, the Operator Panel can be returned to “Full Operation” if so desired.

4) When “Page width 8” is selected on the ML321 Turbo, the character printing wid th per line is set to 8 inches.

5) With Form Tear Off function “on”, if the printer is idle for a few moments (approx. 0.5, 1, 2 sec.), the paper is forward advanced, from the current print position, to the tear bar position. If more data is received and processed by the printer, the paper is then automatically reversed fed back to the original printing position.

6) Displayed only for roll paper is connection.

7) Displayed only for ML emulation.

8) Displayed only for IBM emulation.

9) Displayed only for CSF (Double Bin) connection.

10) Displayed only for EPSON emulation.

11) Common to Bin, 1 and Bin 2.

12) Displayed only for serial I/F board mounting with F/W for 38400 BPS.

11.5.2 Sample Print Self-test

1) Start

Depress and hold the LF switch, while moving the power switch to the “on “ position.

2) Stop

Depress SEL switch.
The printer will finish printing current line before stopping and returning to its default state.

3) Print header

At the beginning of Self Test, the product description header will be printed as follows

aaaaa bbb E F/W ee.ff YR gggg-hhhh-ii
CG jj. kk

... as defined by ...

Position & Char. Count	Description	Data Printed	Comments
aaaaa	Model name	ML3320	Narrow chassis
		ML3321	Wide chassis
bbb	Compatibility	MIE	ML/EPSON/IBM compatible
ee.ff	Revision #	00.00-99.99	Firmware revision
gggg	ROM Type	4110	
hhhh	Part Number	3049	
ii	Part Number	01-99	ROM-FD Number
jj.kk	Revision #	00.00-99.99	CG revision

4) Test pattern

The test pattern is the consecutive printing of all ASCII characters (20H to 7EH) in all print mode combinations with their corresponding pitches and is the same for all models.

HSD	10, 12, 17.1 CPI
UTL	10, 12, 17.1 CPI
NLQ	10, 12 CPI
NLQ	10 CPI DH/DW (Note 1)

• Number of Characters Printed per Line

CPI	Narrow	Wide
5	40	40
10	80	80
12	96	96
17.1	137	137

(Note 1) Scalable font in case of the optional ROM.

5) Operator panel display

While in the Self Test mode ...

(a) MENU mode LED = off

(b) SEL LED = off

(c) CPI LEDs = change when CPI changes

(d) Print Quality LEDs = change when Print Quality changes

6) Communication interface

Printer is in the deselect state.
Data cannot be received during self test mode.

11.5.3 Rolling ASCII Self-test

1) Start

Depress and hold the QUIET/TOF switch, while moving the power switch to the “on” position.

2) Stop

Stop the test by depressing the SEL switch.

3) Print header

a. Header:

aaaaa bbb E F/W ee.ff YR gggg-hhhh-ii
CG jj. kk

... as defined by ...

Position & Char. Count	Description	Data Printed	Comments
aaaaa	Model name	ML3320 ML3321	Narrow chassis Wide chassis
bbb	Compatibility	MIE	ML/EPSON/IBM compatible
ee.ff	Revision #	00.00-99.99	Firmware revision
gggg	ROM Type	4110	
hhhh	Part Number	3049	
ii	Part Number	01-99	ROM-FD Number
jj.kk	Revision #	00.00-99.99	CG revision

4) Test pattern

(a) Printing features/modes = Current Menu value.

(b) Pattern will be continuous printed of all ASCII characters. (20H to 7EH)

(c) Number of Characters Printed per Line

CPI	Narrow	Wide	Note 1)
10	80	136	(80)
12	80	136	(80)
17.1	80	136	(80)
20	80	136	(80)

Note 1) When the Page width of the menu is set to 8 inches.

5) Operator panel display

While in the Self Test mode ...

(a) MENU mode LED = off

(b) SEL LED = off

(c) CPI LEDs = Current Menu value

(d) Print Quality LEDs = Current Menu value

6) Communication interface

Printer is in the deselect state.
Data cannot be received during Rolling ASCII Self-test mode.

11.5.4 Hex-dump

1) Overview

This mode allows the user to diagnose problems in their program or application by printing the hexadecimal and ASCII equivalent number of the data that was sent to the printer. Normally, this data is interpreted by the printer to be a command or printable character, however in this mode, all data is just converted to the hex and ASCII equivalent and printed in the “Hex-Dump” format.

2) Operation method

(a) Start

Depress and hold the SEL and FF switches simultaneously, while moving the power switch to the “on” position.

(b) Stop

Move the Power switch to the “OFF “ or press the Reset switch.

(c) Print pattern

Hex equivalent of received data ASCII equivalent

Hex Data Dump
< LF>

XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX ....

XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX ....

XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX ....

.

.

.

etc.

Note 1 : All ASCII control codes are printed as an period “.”.

(d) ASCII equivalent of incoming data

00H — 1FH = ASCII “period”

20H — 7EH = normal ASCII equivalent

7FH = ASCII “period “

80H — 9FH = ASCII “period”

A0H — FEH = normal ASCll equivalent

FFH = ASCII “period”

(e) Details

1. Printing features/modes = Utility/10 CPI.
2. This function operates with both the serial and parallel communication interfaces.
3. When using cut-sheet paper, printing will stop 1 line from the bottom edge of the page.

   Hex-dump print action is initiated when more than 16 bytes of data is received (one full Hex-dump print line). If less than 16 bytes of data is received, the data will be printed automatically after a “time out” condition is detected (approximately 150 ms).

5. HEX dump prints bidirectionaly.

11.5.5 Auto Park/Insert Sheet

1) Overview

This function allows the user to easily switch from printing on conditions form paper, to printing on cut-sheet paper without removing the continuous form paper from the printer.

2) Operation method

(A) Procedure to park the continuous-form paper and insert a single cut-sheet.

(a) Tear the continuous-form paper using the integrated tear bar.

(b) Make sure the SHIFT + MENU switch is set to “PRINT” mode not “MENU “ mode.

(c) Depress the PARK switch. This will cause the printer to ...

a. deselect

b. check the rear-feed paper switch ... if rear-feed paper is detected, continue with step “c”, if not rear-feed, abort function.

c. retract (reverse feed) the continuous-forms paper out of the platen, but not out of the push tractor.

(d) Move Paper Release Lever from the continuous-forms position, to the cut-sheet position.

(e) Place the cut-sheet paper (using the paper guide)

(B) Steps to return to continuous-form paper.

(a) After the cut-sheet page is ejected from the printer, move the Paper Release Lever from the cut-sheet position, to the continuous-forms position.

(b) Press the FF/LOAD switches simultaneously.

This will cause the printer to ...

a. high speed skip the print head to the center of the paper

b. feed continuous-form paper from the push tractor, over the paper switch, and on to the paper load position.

3) Details

(a) After the 1st piece of cut-sheet paper is fed out of the printer (by normal printing operation) the 2nd piece of cut sheet paper can be inserted by using steps a-e.

(b) The TOF can be adjusted by simultaneously pressing the LF and SHIFT switches or the FF and SHlFT switches. (paper must be in the tear-off position)

SHIFT + LF = reverse fine LF (1/144 inch)

SHIFT + FF = forward fine LF (1/144 inch)

(Pressing the QUIET and PARK switches or FF and TEAR switches simultaneously while powering on the printer will reset the TOF to the factory default position.)

11.5.6 Form Tear-off

1) Overview

Forms Tear-off allows the user to tear off the fan fold paper at any desired position by automatically advancing the paper to the cutting edge of the front access cover. The printer performs up and down operations alternately when the TEAR switch is pressed.

2) Operation method

(a) Conditions:

(1) Continuous form paper is loaded, paper release lever set to tractor feed.

(2) Menu is set to Form Tear-off = 500 ms, 1 sec, 2 sec.
(The function is enabled even when the TEAR switch is “OFF. “)

(b) Tear Position:

(1) Use Auto-Loading of continuous form paper.

(2) Adjust to desired Tear-off length using fine LFs. (paper must be in the tear-off position)

SHIFT + LF = Reverse Fine LF.

SHIFT + FF = Forward Fine LF.

(depress the QUIET + PARK or FF + TEAR switch while powering on the printer to reset the TOF to the factory default position)

3) Details

(a) Paper will advance to Tear-off position approximately 500 ms, 1 sec, 2 sec after printing.

(b) When data is received by the printer, or SEL switch is pressed to select the printer, the paper will retract to the user defined printing position.

12. COMMAND DESCRIPTION

12.1 Horizontal Control

1) Carriage return—execute

   (a) Code: CR

   (b) Compatibility: EPS FX/IBM III/ML

   (c) Function:

   Initiate printing action; print data in the print buffer by causing a print block change and set the next printable data's print position to the left margin.

   (d) Additional details:

   - If Auto-LF is activated, a CR will also cause a LF to execute. This action will take place if there is, or if there is not data in the print buffer.
   - The text feature, "Double Wide (expanded)—one line only", designated by SO and ESC SO (Epson mode only) will be reset since the "CR" terminates the current print line.

2) Backspace

   (a) Code: BS

   (b) Compatibility: EPS FX/IBM lll

   (c) Function:

   Print the data in the print buffer and move the printhead one current character width to the left.

   (d) Additional details:

   - Size (distance) of the BS are as follows:
     BS + DBL-Width → double width BS
     BS + char. pitch → BS the amount of the current char. pitch
     BS + Inter-char clearance → BS normal char width + clearance
     BS + Proportional → causes the print head to backspace a 10 CPI character width.
   - If a multipass character (ex. double height characters) is in the print buffer, when BS is executed, the paper is reverse feed back to the original printing position of the multipass character, and the character is printed. (Precise printing is not guaranteed).
   - Once the current print position has reached the left margin, BS will be ignored. (Epson)
   - The print head backspaces to the left margin position. (IBM)
   - BS + right, center, full justification → BS is ignored.

3) Backspace

   (a) Code: BS

   (b) Compatibility: ML

   (c) Function:

   Move the printhead one current matrix cell width (character cell and Inter-character clearance columns) to the left.

(d) Details

- If a multipass character (ex. double height characters) is in the print buffer, when BS is executed, the paper is reverse feed back to the original printing position of the multipass character, and the character is printed. (Precise printing position is not guaranteed).
- If no “printable” data (including “space) has been previously received by the printer, the BS is ignored.
- If there is character data on a line formed by 12 vertical dots, such as Line Graphics, and a BS command is executed, the printer performs a line feed to the printing position of the next data block and prints.
- The left margin is the limit to the positioning of the printhead when multiple BS commands are executed. Any subsequent BS commands, processed after this limit is reached, are ignored.
- Regardless of any CPI change in the middle of the print line, the distance that the printhead moves backward is the same as the width of the matrix cell (which includes Inter-character clearance columns) of the CPI that was active previous to the processing of the BS command.
- Backspace does not initiate printing action (block change); it is executed when character data or a “initiate printing action” command is received.
- BS + DBL-Width → double width BS
- BS + Inter-char clearance → BS normal char width + clearance
  BS + Proportional → Current CPI character width without proportional.

4) Delete

(a) Code: DEL

(b) Compatibility: EPS FX

(c) Function:

Delete the last printable character data in the print buffer.

(d) Additional details:

- If the data which is to be deleted is a SP code, (20) H or (32) D, one SP code is deleted by this command.
- If the data which is to be deleted is in bit image graphics, this command is ignored.
- H-TABs are not deleted.

5) Print direction—select unibidirectional print

(a) Code: ESC U n

(b) Compatibility: EPS FX/IBM lll

(c) Function:

Choose between left-to-right (unidirectional) printing which achieves improved inter-line print registration, or Bidirectional printing which achieves faster throughput.

(d) Range:

	Unidirectional	Bidirectional
Epson	01H, 31H, 81H, or B1H	00H, 30H, 80H, or B0H
IBM	Odd numbers	Even numbers

(e) Out of Range:

This command will be ignored if n equals any other values except for the values mentioned above.

(f) Additional details:

- Short-Line-Seeking is performed in both unidirectional and bidirectional print modes.
- When the first thermal threshold of the printhead is sensed, the printer automatically enters unidirectional printing mode.

6) Print direction—unidirectional print—one line only

(a) Code: ESC <

(b) Compatibility: EPS FX

(c) Function:

For one print line only, choose left-to-right (Unidirectional) printing for improved inter-line print registration.

(d) Additional details:

- Subsequent lines will be printed bidirectionally, according to short line logic seeking priorities.

7) Print Direction—Uni-directional

(a) Code: ESC—

(b) Compatibility: ML

(c) Function:

Print while moving the carriage from left to right only; used to improve dot alignment between print lines.

(d) Details:

- Uni-directional short line seeking is performed.

8) Print direction—bi-directional

(a) Code: ESC =

(b) Compatibility: ML

(c) Function

Cancel Uni-directional print and return to Bi-directional print for quicker throughput.

(d) Details:

Bi-directional printing is the power-up default and the normal mode of printing.

9) Print position—execute print position from left margin

(a) Code: ESC $ n1 n2

(b) Compatibility: EPS FX

(c) Function:

Initiate printing action by starting to print at the position specified from the left margin.

(d) Range:

- n1 is a decimal number value 0 – 255.
- n2 is a decimal number value 0 – 255.

(e) Out of range:

Any position specified beyond the right margin is ignored.

(f) Additional details:

- Dot position = (n1 + n2*256)/60 to the right of the left margin.
- The position specified as n 1 = n2 = 0 is the left margin.
- Physical Upper Limit...

  Wide chassis ... (n1 + n2*256)/60" ≦ 13.6 (inches) narrow chassis ... (n1 + n2*256)/60" ≦ 8.0 (inches)
- Logical Upper Limit ...
- Absolute Position ≦ Right Margin
- No underlines are made in the print line area skipped by the positioning.

10) Print position—define print position from Home Position

(a) Code: ESC % B n1 n2 n3 n4

(b) Compatibility: IBM III/ML

(c) Function:

Set the next printing position, by dot columns, absolute to the home position.

- n1 is a decimal number value 48 – 57 (ASCII 0 – 9)
- n2 is a decimal number value 48 – 57 (ASCII 0 – 9)
- n3 is a decimal number value 48 – 57 (ASCII 0 – 9)
- n4 is a decimal number value 48 – 57 (ASCII 0 – 9)
- 0000 ≦ n1 n2 n3 n4 ≦ Right margin.

RIGHT MARGIN IN UNITS OF DOTS COLUMNS

CPI	wide chassis	narrow chassis
10	1633	961
12	1959	1153
15	2449	1441
17.1	2798	1646
20	3264	1921

(e) Additional details:

- n1 – n4 is a 4 digit ASCII number; leading zeros must be input even if the number is less than 1000.

  Example: 250 → 0250
- This command will be ignored if print position set by this command exceeds the right margin or left margin.
- No underlines are made in the print line area skipped by the positioning.

11) Print position—define right relative position

(a) Code: ESC% E n1n2n3n4

(b) Compatibility: ML

(c) Function:

Moves the next print position by a number of dot columns (specified by n1n2n3n4) to the right from the current print position.

(d) Variable range:

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30H – 39H
n2	0 – 9	48 – 57	30H – 39H
n3	0 – 9	48 – 57	30H – 39H
n4	0 – 9	48 – 57	30H – 39H

(e) Out of range:

- If the code for n1n2n3n4 is other than the above, this command is ignored.

(f) Logical limitation:

- The printer ignores this command if the command attempts to set a print position exceeding the right margin.

(g) Additional details:

- The number n1n2n3n4 is a 4-digit decimal number. Since all digits must be defined, any number that does not use all digits must be padded with leading zeros.

  EXAMPLE: 25 → 0025

- If n1n2n3n4 = 0000 is specified, this command is ignored and the printer maintains the current print position.
- No underlines are printed in the print line areas skipped by this command.

12) Print position—define left relative position

(a) Code: ESC % F n1n2n3n4

(b) Compatibility: ML

(c) Function:

- Moves the next print position by a number of dot columns (specified by n1n2n3n4) to the left from the current print position.

(d) Variable range:

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30H – 39H
n2	0 – 9	48 – 57	30H – 39H
n3	0 – 9	48 – 57	30H – 39H
n4	0 – 9	48 – 57	30H – 39H

(e) Out of range:

- If the code for n1n2n3n4 is other than the above, this command is ignored.

(f) Logical limitation:

- The printer ignores this command if the command attempts to set a print position exceeding the left margin.

(g) Additional details:

- Number n1n2n3n4 is a 4-digit decimal number. Since all digits must be defined, any number that does not use all digits must be padded with leading zeros.

  EXAMPLE: 25 $\rightarrow$ 0025

- If n1n2n3n4 = 0000 is specified, this command is ignored and the printer maintains the current print position.
- No underlines are printed in the print line areas skipped by this command.
- When the printer receives a valid n1n2n3n4 number, it prints out the data stored in the printer buffer.

13) Print position—define indexed position—by dot column

(a) Code: ESC\n1 n2

(b) Compatibility: EPS FX

(c) Function:

Set the next printing position, by dot columns, indexed from current print position.

(d) Range:

- n1 and n2 specify a signed 16 bit binary number of dot columns to move; the lower byte is n1, and the upper byte is n2.
- Range n1 and n2 = 0 – 255

(e) Logical limitation:

- Value defined beyond the left or right margins are ignored.

(f) Additional details:

- The new print position is indexed from the current printing position and may be either to the left or the right of the current position.
- Positive values move the print position to the right and negative values move it to the left.
- Do position = n1 + n2*256
- Values are shown as follows:

  Narrow — FCH, 40H $\leqq$ n2, n1 $\leqq$ 03H, COH

  Wide — F9H, A0H $\leqq$ n2, N1 $\leqq$ 06H, 60H

- Underlined printing is enabled only when the print head moves to the right.
- A position defined to the left of the current position initiates printing action by causing a block change.
- The amount of print position can not be deleted by the DEL command.

14) Print position—define relative dot position

(a) Code: ESC/n1n2

(b) Compatibility: IBM III

(c) Function:

Moves the current logical horizontal print position by n/120 inch from the current print position.

(d) Range:

- The number n1 is the low byte and n2 is the high byte in the dot position setting code.
- The number n1n2 is a decimal number between 0 and 255 (if n1 = n2 = 0 is specified, the printer maintains the current position).
- Limit

  FC40H ≦ n1 + n2×256 ≦ 03C0H (ML3320)

  F9A0H ≦ n1 + n2×256 ≦ 0660H (ML3321)

(e) Out of range:

- The printer ignores this command if the command attempts to set a print position exceeding the left/right margin.

(f) Additional details:

- Scores can be added only when the print head moves to the right from the current print position.
- When the print head moves to the left from the current print position, the printer prints out the data stored in the printer buffer.

15) Set print position

(a) Code: ESC DLE @ n A1 A2 P1P2P3P4

(b) Compatibility: EPSON FX/IBM III/ML

(c) Function:

Sets the next horizontal print position. The data received after the printer receives this command is printed out from the new print position.

(d) Range:

- The number n is used to specify the number of bytes of the parameters which follow n.

  0≦n≦255

- The number A1 is used to specify the type of print position.

  0≦A1≦255

  Specify an even number for A1 to specify an absolute print position from the left margin. Specify an odd number for A1 to specify a relative print position from the current print position.

- The number A2 is used to specify the direction of movement of the relative print position.

  0≦A2≦255

  Specify an even number for A2 to specify movement toward the right margin (forward). Specify an odd number for A2 to specify movement toward the left margin (reverse). The number P1P2P3P4 is used to specify the print position.

- 0 ≦ P1P2P3P4 ≦ 255 (a number between 0 and 9 specified for the lower 4 bits is valid. The printer ignores the upper 4 bits.) The number P1P2P3P4 should be specified with a 4-digit decimal number where: P1 = thousands digit, P2 = hundreds digit, P3 = tens digit, and P1 = units digit.

(e) Out of range:

- The printer ignores this command if the command attempts to set a print position exceeding the left/right margin.

(f) Additional details:

- When the print head moves toward the left margin (reverse) from the current print position, the printer prints out the data stored in the printer buffer.

  Scores can be added when print head movement toward the right margin (forward) from the current print position is specified while the score mode is set.

16) Horizontal tabs — define stops — by characters

(a) Code: ESC D × 1, ×2, ×3 ... xk NUL

(b) Compatibility: EPS FX/IBM III

(c) Function:

Set, by character columns, up to a maximum of 32 tab (Epson) or 28 tab (IBM) positions.

(d) Range:

- Range k = 1 – 32 (Epson)
  = 1 – 28 (IBM)
- Range x = 1 – 255 (Epson)
  = 1 – 255 (IBM)

Epson

CPI	Wide	Narrow
10	135	79
12	163	95
15	203	119
17.1	233	137
20	255	159

IBM

CPI	Wide	Narrow
10	136	80
12	164	96
15	204	120
17.1	234	138
20	255	160

(e) Out of range:

- If k>32 (Epson) or k>28 (IBM) the following value of x will be ignored.
- Maximum x value in each CPI, values larger than maximum are ignored.

(f) Additional details:

- Tabs are set at every 8 character after powering up the printer, receiving an I PRIME (INIT) signal or executing an ESC @ (Epson), ESC R (IBM III), ESC } NUL and ESC { n.
- The entire command string is terminated with a NUL [CHR$(0)] or a number less than the last tab setting specified. (Epson)
- The tab settings n1, n2, n3 nk must be entered in ascending order.
- Tabs are absolute position. However, if the left margin is changed, HT position is changed according to the left margin. (IBM)
- Tabs are not reset to default if Left margin is changed. (EPSON)
- If n = 0, clear all tabs set.
- If there is not a nul at the 33rd (Epson)

- This command is disregarded while nk-1 ≤ nk or the printer encounters a null character. A maximum of 32 tab stops can be set. If there is no null character at the 29th value of n, this command is disregarded until the printer encounters a null character. Tab positions set up to the 28th n value are enabled. (IBM)

  Example: If ESC D n1 n2 n4 n3 NUL,

  n1 < n2 < n3 < n4 → valid n1 – n4.

  n1 < n2 = n3 < n4 → valid n1 – n2 (Epson)

  Valid n1, n2, n4 (IBM)

17) Horizontal tab—execute

(a) Code: HT

(b) Compatibility: EPS FX/IBM III

(c) Function:

Advance from the current print position to the next Horizontal Tab position.

(d) Additional details:

- Tab positions are based on the character pitch in force at the time the horizontal tab is set (IBM)
- Tab position is absolute. If the character pitch is changed, including double width, the tabs will remain in the same absolute locations. (Epson)
- Upon power up the default tabs are set at columns 9, 17, 25, 33 ... and every eight spaces after that.
- HT will become invalid when it exceeds right margin setting. If an HT is executed past the right margin, if will cause the next character to be printed immediately after the last. All subsequent HT's will correspond to the beginning of the TAB setting sequence.
- No underline will be come in the "skip" area.

18) Horizontal tabs—define stops—default values

(a) Code: ESC R

(b) Compatibility: IBM III

(c) Function:

- This command sets horizontal tabs at every 8th position starting at column 9 and clears all vertical tabs.

19) Horizontal tabs—define stops—by characters

(a) Code: ESC, HT X1 Y1 Z1, ... , Xm Ym Zm CR

(b) Compatibility: ML

(c) Function:

Clear all previously defined H-tabs and define up to 16 new horizontal tab stop positions from the left-most physical print position in units of character columns.

(d) Range:

- Variables

	ASCII	Decimal	Hexadecimal
X1	0 – 9	48 – 57	30 – 39
Y1	0 – 9	48 – 57	30 – 39
Z1	0 – 9	48 – 57	30 – 39

m (number of tabs) = 0–16

- Argument “X1Y1Z1”

	10 cpi	12 cpi	17.1 cpi	20 cpi
wide chassis	136	163	233	272
narrow chassis	80	96	137	160

(e) Out of range:

- The command will be ignored.

(f) Logical limitations:

XmYmZm represents a 3 digit number where each consecutive XmYmZm number must be greater than the previous one or else Xm Ym Zm is ignored.

X1 Y1 Z1 < X2 Y2 Z2 < ... < Xmax Ymax Zmax

(g) Details:

- Maximum of 16 HT stops maybe defined.
- Horizontal tab settings can be cleared by:
  - — ESC HT CR (defining no tabs)
  - — ESC HT 000 CR (defining no tabs)
  - — ESC HT 001 CR (defining no tabs)

Note: Tab position “0” and tab position “1” both represented the first column position on the print line.

- X1 Y1 Z1 is a 3-digit ASCII numeric. A 2-digit or 1-digit X1Y1Z1 number can be specified, however, by separating it from the subsequent parameters with a comma.
- Upon Power-Up and reset conditions, such as l-Prime, the default tabs are set at character columns 9, 17, 25, 33 ... and every eight character columns after that.
- Horizontal Tab positions are relative to the character pitch. While in 10 cpi, a H-tab of 10 characters will represent a physical distance of 1 (10/10th) inch. This same 10 character H-tab in 12 cpi will represent a physical distance of 11/12th of an inch.
- Refer to the Illustration attachments for further details.

20) Horizontal tabs – define stops – by dot column

(a) Code: ESC ETX X1 Y1 Z1 W1, ... , Xm Ym Zm Wm CR

(b) Compatibility: ML

(c) Function:

Clear all previously defined H-tabs and define up to 16 new horizontal tab stop positions from the left-most physical print position in units of dot columns.

(d) Range:

- Variables

	ASCII	Decimal	Hexadecimal
X1	0 – 9	48 – 57	30 – 39
Y1	0 – 9	48 – 57	30 – 39
Z1	0 – 9	48 – 57	30 – 39
W1	0 – 9	48 – 57	30 – 39

m (number of tabs) = 0–16

- Argument “x1y1z1w1”

	10 cpi	12 cpi	17.1 cpi	20 cpi
wide chassis	1,632	1,956	2,796	3,264
narrow chassis	960	1,152	1,644	1,920

(e) Out of range:

The command will be ignored.

(f) Logical limitations:

XmYmZmWm represents a 4 digit number where each consecutive XmYmZmWm number must be greater than the previous one or else Xm Ym Zm Wm is ignored.

(g) Details:

- Maximum of 16 HT stops may be defined.
- Each tab must be defined in ascending order.
- Horizontal tab setting can be cleared by:
  - — ESC ETX CR (defining no tabs)
  - — ESC ETX 0000 CR (defining no tabs)
  - — ESC EtX 0001 CR (defining no tabs)

Note: Tab position “0” and tab position “1” both represented the first column position on the print line.

- X1 Y1 Z1 W1 is a 4 digit ASCII numeric.
- X1Y1Z1W1 should be a 4-digit ASCII number. An X1Y1Z1W1 number of 3-digits or less can be specified, however, by separating it from the subsequent parameters with a comma.
- Upon Power-Up and reset conditions, such as I-Prime, the default tabs are set at columns 97, 193, 289 ... and every 96 dot columns after that.
- Horizontal Tab positions are relative to the character pitch. While in 10 cpi, a H-tab of 120 columns will represent a physical distance of 1 inch. This same 120 columns H-tab in 12 cpi will represent a physical distance of 120/144th of an inch.
- H-TABS by dot column are valid when combined with Bit Image Graphics and Proportional Width Characters.

21) Horizontal tab—execute

(a) Code: HT

(b) Compatibility: ML

(c) Function:

Advance from the current print position to the next Horizontal Tab position.

(d) Logical limitations:

- An HT can not be executed beyond the right margin.

(e) Details:

- HT execution will cause an advance to the next tab stop position defined by the “H-TAB by characters” or “H-TAB by columns” definition commands; which ever HT command was most recently defined.
- When character pitch is changed, tab position will be recalculated based on the new pitch.
- HT will become invalid when it exceeds right margin setting. If an HT is attempted past the right margin, it will cause the next character to be printed immediately after the last. All subsequent HT’s will correspond to the beginning of the TAB setting sequence.
- If the Underline print feature is “on”, the area of the page that the HT skips over will not be underlined.

22) Margins—define left margin

(a) Code: ESC/n

(b) Compatibility: EPS FX

(c) Function:

Left margin is set at (n) characters from the left-most physical print position.

(d) Range:

- Range n = 0 – 255

NAME	Pitch	Wide	Narrow
PICA/PROPORTIONAL	10	1 – 134	1 – 79
ELITE	12	1 – 162	1 – 94
	15	1 – 202	1 – 118
COMPRESSED	17.1	1 – 231	1 – 135
COMPRESSED ELITE	20	1 – 255	1 – 157

(e) Out of range:

- If n exceeds the right margin, the left margin command will be ignored.

(f) Additional details:

- Left margin positions are based on the character pitch which is in force at the time the left margin is set. Left Margin’s position is absolute. If the character pitch is changed, the margin will NOT move to accommodate the change.
- While in proportional mode, the print column width of the margin will be set in pica character size.

- The left margin will remain at value set unless reset by some software code or the printer is turned off.
- Input of the ESC/ code with a valid left margin parameter causes the horizontal TAB positions previously set to be cleared, and the subsequent horizontal TAB will default to every 8 character positions starting with the new left margin as position 0.
- There must be a difference of at least 25 character between the left margin and right margin values for 10 CPI.

23) Margins—define right margin

(a) Code: ESC Q n

(b) Compatibility: EPS FX

(c) Function:

Right margin is set at (n) characters from the left-most physical print position.

(d) Range:

- Range n = 1 -255

NAME	Pitch	Wide	Narrow
PICA	10	2 – 136	2 – 80
ELITE	12	3 – 164	3 – 96
	15	3 – 204	3 – 120
COMPRESSED	17.1	4 – 234	4 – 138
COMPRESSED ELITE	20	4 – 255	4 – 160

(e) Out of range:

- The number “n” must be within the ranges given above, otherwise it will be ignored.
- If n = 0, or is less than or equal to the left margin this command is ignored.

(f) Additional details:

- Right margin positions are based on the character pitch which is in force at the time the right margin is set.
- Right Margin’s position is absolute. If the character pitch is changed, the margin will NOT move to accommodate the change.
- While in proportional mode, the print column width of the margin will be set in pica character size.
- Setting Right margin clears the print buffer.
- There must be a difference of at least 25 character between the left margin and right margin values for 10 CPI.
- If you attempt to print a character beyond the right margin the character will be printed on the next line after a line feed and carriage return are executed.

24) Margins—define left & right margin

(a) Code: ESC X n1 n2

(b) Compatibility: IBM III

(c) Function:

Set the Left Margin to (n1) characters and Right Margin to (n2) characters from the left-most physical print position.

(d) Range:

- The ranges for n1 and n2 are $1 \leqq n1 \leqq 255$

  $2 \leqq n2 \leqq 255$

  $n1 < n2$

(e) Out of range:

- If n1 or n2 = 0 then the current margin setting is used.
- If n2 exceeds the default range n2 shall be converted to the default value.

	10CPI	12CPI	15CPI	17.1CPI	20CPI
Wide Column	136	164	204	234	255
Narrow Column	80	96	120	138	160

(f) Additional details:

- The default value of the left margin is the 1st character.
- The margin's positions are absolute. If the character pitch is changed, the margins will NOT move to accommodate the change.
- Character pitch changes afterwards do not affect the distance from the home position.
- n1 n2 indicates the left and right edges of printable area. For example if n1 = 10, n2 = 100, a printable area is from the 10th column to the 100th column: 91 characters are printable.

25) Print-Line justification—select

(a) Code: ESC a n

(b) Compatibility: EPS FX

(c) Function:

The text position/alignment will be set according to one of the four given modes assigned by n. (n is Binary value)

(d) Range:

n	Justification
0	Left
1	Center
2	Right
3	Full

(e) Additional details:

- n = 0 Left justification is the default or standard format, in which the left margin is even and the right margin is not.
- n = 1 The centering command centers a line of text between the margins. This command is used for headings, titles and captions.
- n = 2 Right justification is the opposite of left justification. The right margin is even and the left is not.

- n =3 Full justification puts extra spaces where necessary so that both the left and right margins are aligned.
- Full justification (n = 3) is performed when the printer receives (at the time when printing starts) data exceeding 75% of the maximum number of characters to be printed in a line.
- Print position will be affected by the commands which set the left/right margin.
- This command causes a print block change. If there is data in the print buffer and this command is sent, the data will be printed before the justification takes affect.

Note: When you use the Auto Justification, use carriage returns at the end of paragraphs only, not at the end of each line of text.

26) Margins—define left margin

(a) Code: ESC % C n1 n2 n3

(b) Compatibility: ML

(c) Function:

Define the logical left-most printing position limitation from the left most-physical print position in units of 1/120 inch.

(d) Range:

• Variable

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39
n2	0 – 9	48 – 57	30 – 39
n3	0 – 9	48 – 57	30 – 39

• Argument “n1n2n3”

narrow chassis 000-900 × 1/120 inches (approx. 7.5 inches max.)
wide chassis 000-999 × 1/120 inches (approx. 8.3 inches max.)

(e) Out of range:

• If any digit is out of range, the command is ignored.

(f) Logical limitation:

• If n1n2n3 exceeds the maximum value, the command will also be ignored.
• Set number difference between right margin and left margin must be a minimum of 60, otherwise the command will be ignored.

(g) Details:

• n1n2n3 is a 3 digit ASCll number. Since all digits must be defined, any number that does not use all digits must be padded with leading zeros.

EXAMPLE: 8 → 008.

• When n1n2n3 = 000, the command will be ignored.
• When n1n2n3 = 001, the left margin will be cleared.
• If the left margin is defined after one or more characters have been sent to the current print line, the left margin will not become valid for the current print line, but will be valid on the next print line.

27) Margins—right margin

(a) Code: ESC % R n1 n2 n3 n4

(b) Compatibility: ML

(c) Function:

- Define the logical right-most printing position limitation from the left most-physical print position in units of 1/120 inch.

(d) Range:

Variable

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39
n2	0 – 9	48 – 57	30 – 39
n3	0 – 9	48 – 57	30 – 39
n4	0 – 9	48 – 57	30 – 39

- Argument

	narrow chassis	wide chassis
w/o Left Margin	$60 < RM \leqq 960$	$60 < RM \leqq 1632$
w/ Left Margin	$LM + 60 \leqq RM \leqq 960$	$LM + 60 \leqq RM \leqq 1632$

(e) Out of range:

If any variable is out of range, the command is ignored and any subsequent variables are interpreted as normal data.

(f) Logical limitation:

- The Right Margin can not be defined within 60/120 inch (1/2 inch) from the Left Margin or can not be defined to the left of the Left Margin. If this is attempted the command will be ignored.

(g) Details:

- n1n2n3n4 is a 4 digit ASCII number. Since all digits must be defined, any number that does not use all digits must be padded with leading zeros.

  EXAMPLE: 8 $\rightarrow$ 0008.

- When n1n2n3n3 = 0000, the Right Margin will be set to the default value.
- Explanation of illegal variable results (n2 = out of range):

  ESC % R n1 n2 n3 n4

  n3 and n4 interpreted as normal data

  command is aborted

- If the right margin is defined after one or more characters have been sent to the current print line, the right margin will not become valid for the current print line, but will be valid on the next print line.

12.2 Vertical Control

1) Line spacing—select fixed amount—1/6 inch

   (a) Code: ESC 2

   (b) Compatibility: EPS FX

   (c) Function:

   Set the line spacing to 1/6 inch units.

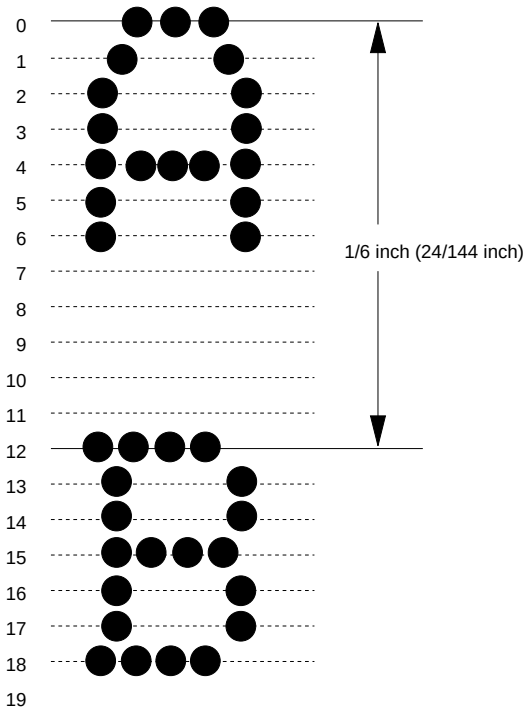
   (d) Additional details:

   - This command will remain in effect until a new line spacing command is sent to the printer.
   - This command does not set the top of form position.
   - LF, VT, or CR (if Auto F is on) execute in units of 1/6 inch when this function is active.

   (e) Related functions:

   - LF, VT, CR (and Auto LF)

6 LPI (Lines per inch):



2) Line spacing—select fixed amount—1/6 inch

(a) Code: ESC 6

(b) Compatibility: ML

(c) Function:

Set the line spacing to 1/6 inch units (6 LPI).

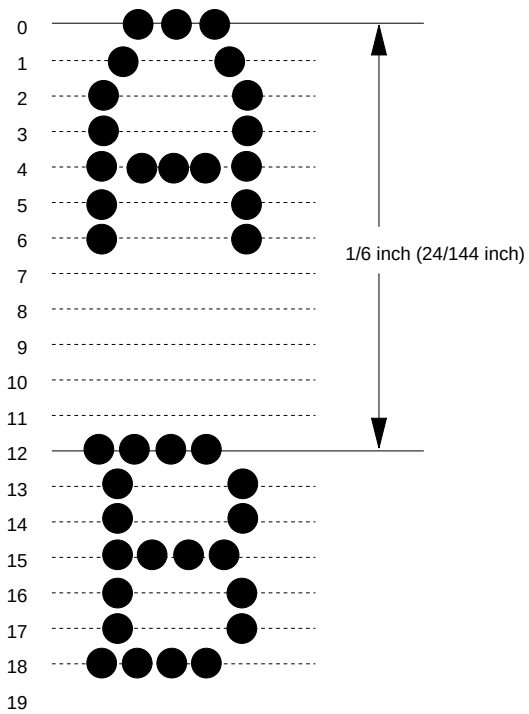
(d) Details:

- This command remains in effect until a new line spacing command is sent to the printer.
- This command does not set the top of form position.
- LF, VT, or CR (if Auto LF is on) execute in units of 1/6 inch when this function is active.
- Refer to the illustration attachments for further details.

(e) Related functions:

- LF, VT, CR (and Auto LF)

6 LPI (Lines per Inch):



3) Line spacing—select fixed amount—1/8 inch

(a) Code: ESC 0

(b) Compatibility: EPS FX/IBM III

(c) Function:

Set the line spacing 1/8 inch units.

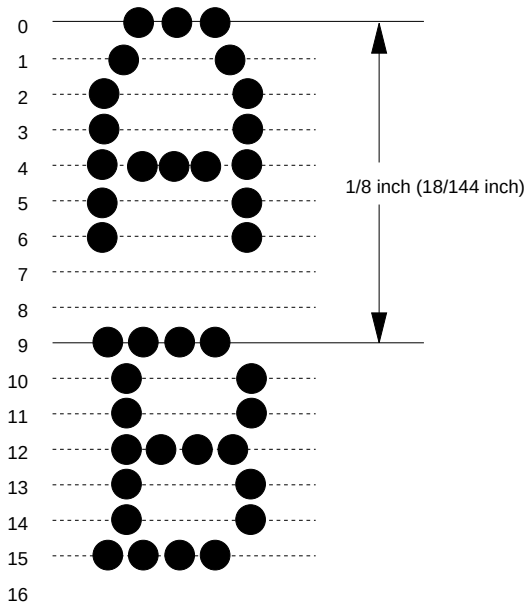
(d) Additional details:

- This command remains in effect until a new line spacing command is sent to the printer.
- This command does not set the top of form position.
- LF, VT, or CR (if Auto LF is on) execute in units of 1/8 inch when this function is active.

(e) Related functions:

- LF, VT, CR (and Auto LF)

8 LPI (Lines per Inch):



4) Line spacing—select fixed amount—1/8 inch

(a) Code: ESC 8

(b) Compatibility: ML

(c) Function:

Set the line spacing to 1/8 inch units (8 LPI).

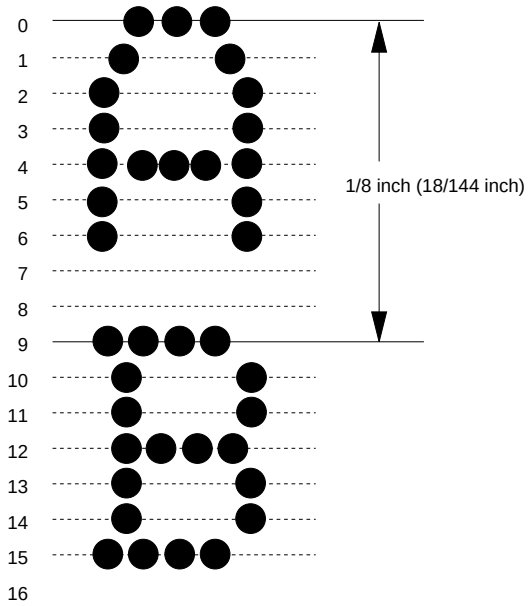
(d) Details:

- This command remains in effect until a new line spacing command is sent to the printer.
- This command does not set the top of form position.
- LF, VT, or CR (if Auto LF is on) execute in units of 1/8 when this function is active.

(e) Related function

- LF, VT, CR (and Auto LF)

8 LPI (Lines per Inch):



5) Line spacing—select fixed amount—7/72 inch

(a) Code: ESC 1

(b) Compatibility: EPS FX/IBM III

(c) Function:

Set the line spacing to 7/72 inch units.

(d) Additional details:

- This command remains in effect until a new line spacing command is sent to the printer.
- This command does not set the top of form position.
- LF, VT or CR (if Auto LF is on) execute in units of 7/72 inch when this function is active.

(e) Related functions:

- LF, VT, CR (and Auto LF)

6) Line spacing—define amount—n/72 inch

(a) Code: ESC A n

(b) Compatibility: IBM III

(c) Function:

Stores the line feed amount in 1/72-inch units.

(d) Range:

Range n = 0 – 255

(e) Out of range:

Not applicable—cannot receive value larger than 255 (FFH).

(f) Additional details:

- If n = 0, the line feed amount is 0 and subsequent print-line will overprint over the same print-line.
- This command does not set the top of form position.
- The ESC 2 command sets the line feed amount stored by this command.

7) Line spacing—define amount—n/72 inch

(a) Code: ESC An

(b) Compatibility: EPS FX

(c) Function:

Sets the line spacing to n/72 inch.

(d) Range:

Range n= 0 to 85, n = 128 to 213 (Bit 7 of the n code is invalid.)

(e) Out of range:

Value of n not within the allowable range will be ignored.

(f) Additional details:

- If n = 0, the line feed amount is 0 and subsequent print-lines will overprint over the same print-line.
- This command does not set the top of form position.
- Power on default or the I-Prime signal resets the LF unit to the current MENU value.

8) Line spacing—define amount—n/216 inch

(a) Code: ESC 3 n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Sets line spacing to n/216 inch.

(d) Range:

- Range n = 0 – 255 (Epson), n = 1 – 255 (IBM)

(e) Additional details:

- If n = 0, the line feed amount is 0 and subsequent characters will overprint over the same print-line. (Epson) If n = 0 is specified, this command will be invalid and the previously set line feed amount remains effective. (IBM)
- This command does not set the top of form position.
- Power on default or the I-Prime signal resets the LF unit to the current MENU value.
- LF, VT, or CR (if Auto LF is on) execute in units of n/72 inch when this function is active.

(f) Related functions:

- LF, CT, CR (and Auto LF)

9) Line spacing—activate amount defined by n/72 inch

(a) Code: ESC 2

(b) Compatibility: IBM III

(c) Function:

Activate the line feed amount defined by the ESC A “n” command.

(d) Details:

- If no ESC A n sequence has been defined, the line spacing amount will be according to current MENU value.

(e) Related functions:

- ESC A n

10) Line feed—execute amount—n/216 inch

(a) Code: ESCJ n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Execute a n/216 inch line feed without changing the current stored line spacing value.

(d) Range:

- Range n = 0 – 255 (Epson), n = 1 – 255 (IBM)

(e) Additional details:

- The printer prints the contents of the buffer without a carriage return. (Epson)

  Moves the current print position to the print start position of next line (left margin position) when the “Auto CR” feature is set to “Yes” in MENU mode. (IBM)
- This command does not need a cancel code, since it is executed only once.
- No feed is performed when n = 0. (Epson)

  If n = 0 is specified, this command will be invalid. (IBM)

(f) Related functions:

- This command does not clear the elongated character mode (double width printed character) selected by ESC SO or SO code.

11) Fine LF—execute—n/144 inch amount

(a) Code: ESC % 5 n

(b) Compatibility: EPS FX/IBM III/ML

(c) Function:

Initiate printing action; print data in the print buffer by causing a print block change and execute a n/144 inch line feed, then a carriage return.

(d) Range:

	Decimal	Hexadecimal
n1	0 – 255	00 – FF
The eight bit (b7) is ignored so the effective range of n1 is as follows ...		
Decimal	Hexadecimal	n1
0 – 127 128 – 255	00 – 7FH 80 – FFH	0 – 127 (0/144” – 127/144”)

(e) Out of range:

Not applicable, can not receive a value larger than 255 (FF)H or smaller than 0.

(f) Details:

- If n1 = 0 the line spacing will be set to a distance of zero, upon execution of a LF.
- If the line spacing is set to zero (n1 = 0), no paper feeding will occur when a LF is executed, but any data in the print buffer will be printed (just as if only a CR was executed.)

12) Line spacing—define amount—n/144 inch

(a) Code: ESC % 9 n1

(b) Compatibility: EPS FX/IBM III/ML

(c) Function:

Set the line spacing to n/144 units.

(d) Range:

	Decimal	Hexadecimal
n1	0 – 255	00 – FF
The eight bit (b7) is ignored so the effective range of n1 is follows ...		
Decimal	Hexadecimal	n1
0 – 127 128 – 255	00 – 7FH 80 – FFH	0 – 127 (0/144” – 127/144”)

(e) Out of range:

Not applicable, can not receive a value larger than 255 (FF)H or smaller than 0.

(f) Details:

- If n1 = 0 the line spacing will be set to a distance zero, upon execution of a LF.
- If the line spacing is set to zero (n1 = 0), no paper feeding will occur when a LF is executed, but any data in the print buffer will be printed (just as if only a CR was executed).

13) Line feed—execute forward LF with CR

(a) Code: LF

(b) Compatibility: EPS FX/IBM III

(c) Function:

Initiate printing action; print data in the print buffer by causing a print block change and execute a line feed, then a carriage return. Moves the current print position to the print start position of next line (left margin position) when the “Auto CR” feature is set to “Yes” in MENU mode. (IBM)

(d) Additional details:

- Line spacing pitch will be set by ESC A n, ESC 0, ESC 2, ESC 3 n, ESC 1, ESC % 9 n. Otherwise, the LF pitch will be set by the current MENU when power is on or I-Prime signal is received.
- This code will cancel enlarged character mode set by the ESC SO (Epson mode only) and SO code before the LF code or only spaces before this code, only line feed is performed.

14) Line feed—execute reverse LF

(a) Code: ESC j n

(b) Compatibility: EPS FX

(c) Function:

Execute an immediate n/216 inch reverse line feed; which will be executed only once each time this command is sent.

(d) Range:

- Range n = 0 – 255

(e) Additional details:

- It is not recommended to use the pull tractor feed unit when reverse line feeds are required.
- The current line spacing will not be changed.

15) Line feed—execute reverse LF—one line only

(a) Code: ESC]

(b) Compatibility: IBM III (Hidden command for user)

(c) Function:

Execute the current LF pitch, reverse line feed; which will be executed only once each time this command is sent.

(d) Additional details:

- It is recommended to use the pull tractor feed unit when reverse line feeds are required.
- The current line spacing will not be changed.

16) Line feed—execute forward LF with CR

(a) Code: LF

(b) Compatibility: ML

(c) Function:

Initiate printing action; print data in the print buffer by causing a print block change and execute a line feed, then a carriage return.

(d) Details:

- This command is equivalent to the composite command (ESC.?.N:) where

  n = (23) H

- The line spacing is set by ESC.6, ESC.8 or ESC.%.9.n command. The line spacing will be set to the default line pitch after a default sequence (power up, I-Prime, and CAN.)

17) Line feed—execute reverse line feed

(a) Code: ESC LF

(b) Compatibility: ML

(c) Function:

Initiate printing action; print data in the print buffer by causing a print block change and execute a reverse line feed and then a carriage return for one line only.

(d) Details:

- Composite command (ESC.?.n.:) for CR/LF will perform.:

  n = (31)H Reverse Line Feed

- When continuous paper or single sheets (fed by the SASF function) are used, unlimited number of reverse LFs may be executed.

- When the CSF is attached to the printer the Reverse LF command will be valid for 1/3 inch (48/144 inch) in order to prevent paper jams.

18) Line feed—automatic LF—ON/OFF

(a) Code: ESC 5 n

(b) Compatibility: IBM III

(c) Function:

Enables/disables the automatic Line Feed. The printer performs an automatic LF each time it receives a carriage return (CR).

(d) Range:

n = 0 – 255

odd numbers = Automatic LF enabled

even numbers = Automatic LF disabled

19) Line feed—W/O carriage return

(a) Code: ESC DC2

(b) Compatibility: ML

(c) Function:

- Initiate printing action; print data in the print buffer by causing a print block change, feed the paper the pre-defined line spacing amount, and set the next printable data's print position to the last position of the previous line (no CR performed).

20) Line feed—execute direct skip

(a) Code: ESC VT n1 n2

(b) Compatibility: ML

(c) Function:

- Initiate printing action; print data in the print buffer by causing a block change, feed the paper the number of lines defined by this command, and set the next printable data's print position to the left margin.

(d) Range:

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39
n2	0 – 9	48 – 57	30 – 39

(e) Out of range:

The command will be ignored.

(f) Details:

- If n1 n2 = 00, no paper feeding is performed.

21) Form length—define amount—by inches

(a) Code: ESC C nul n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Sets the form length to n inches

(d) Range:

- Range n = 1– 22 (Epson)
  1– 255 (IBM)

(e) Out of range:

- n = 0 or n > 22 (Epson) will last valid setting and ignore the command.

(f) Additional details:

- This command does not affect vertical tab settings. (IBM)
  This command will reset vertical tab settings to their default values. (Epson)
- When this command is valid, it cancels the "Skip Over Perforation" feature even if the feature has been selected in the MENU mode.
- Top of form position is set by this command.

22) Form length—define amount—by lines

(a) Code: ESC C n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Sets the form length to n lines length to n lines.

(d) Range:

- Range n = 1 – 127 (Epson)
  1 – 255 (IBM)

(e) Out of range:

- If n = n > 127 (Epson), bit 7 is cleared and set that value as is.

(f) Additional details:

- This command does not affect vertical tab settings. (IBM)
  This command will reset vertical tab settings to their default values. (Epson)
- Top of form will be set.
- When this command is valid, it cancels the “Skip Over Perforation” feature even if the feature has been set in the MENU mode.
- The amount of each line defined by this command, is equal to the current LF spacing defined by ESC 0, ESC 2, ESC A n, ESC 3 n, ESC 1, ESC % 9n.
- If n = 0 or 128 (Epson), this command is treated as ESC C NUL n.

(g) Related functions:

- ESC 0, ESC 2, ESC A n and ESC 3 n, ESC 1, ESC % 9 n.

23) Form length—define amount—by 1/2 inch

(a) Code: ESC G n1 n2

(b) Compatibility: ML

(c) Function:

Define the logical form length by the amount of n1n2 × 1/2 inch and set the TOF position.

(d) Range:

- Variables

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39
n2	0 – 9	48 – 57	30 – 39

Argument

n1n2 range = 00 – 99

(e) Out of range:

The command will be ignored.

(f) Details:

- If n1n2 = 00, the page length will default to the value defined by MENU.
- Maximum form length, 1/2 × 99 = 49.5 inches.
- Factory setting: 1/2 × 22 = 11 inches.

24) Form length—define amount—by lines

(a) Code: ESC F n1 n2

(b) Compatibility: ML

(c) Function:

- Define the logical form length by number of lines, and set the TOF position.

(d) Range:

- Variable

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39
n2	0 – 9	48 – 57	30 – 39

Argument

n1 n2 = 00 – 99

(e) Out of range:

The command will be ignored.

(f) Details:

- If n1n2 = 00, the page length will default to the value defined by MENU.
- Maximum form length is based upon current LF spacing. If this spacing is set to 144/144 inch (maximum value for line spacing), the maximum form length will be 99 × 1 inch = 99 inches.
- If line spacing defined, by ESC % 9 n, is zero, this command will effectively be ignored.

  ESC % 9 0 = 0 line spacing.

  ESC F n1 n2 where n1 n2 = any value.

  Line Spacing Form Length

  0 × (any value) = form length.
- This command will set the top of form and the top of VFU.
- Factory setting: 11 inches

25) Form feed—execute

(a) Code: FF

(b) Compatibility: EPS FX/IBM III

(c) Function:

Prints the data in the print buffer followed by a carriage return, then feeds the paper to the next TOF position.

(d) Additional details:

- Factory setting of form length is eleven (11) inches. (MENU)
- Pressing FORM FEED button on the operator panel feeds the paper forward to the next top of form position.
- A Form feed will be performed to the next top of form position even when the FF is received at the top of form position.
- Double width by ESC SO (Epson mode only) and SO will be reset.
- Power up or 1 Prime will set TOF.

26) Form feed—execute

(a) Code: FF

(b) Compatibility: ML

(c) Function:

- Initiate printing action; print data in the print buffer by causing a print block change, feed the paper the defined form length amount and set the next printable data's print position to the left-margin.

(d) Details:

- Paper length can be set by the ESC F n1 n2 or the ESC G n1 n2 commands.
- Upon power-up, or reception of a reset command, the page length will default to the value set in MENU.
- Factory setting of Form Length is 11 inches.

27) Top of form—define

(a) Code: ESC 5

(b) Compatibility: ML

(c) Function:

Define the top of the form (logical page) and the top of the VFU by logically "marking" the current vertical print position.

(d) Details:

- This command does not affect the CSF or SASF function.

28) Margins—define bottom margin (auto skip)

(a) Code: ESC % S n

(b) Compatibility: ML

(c) Function:

Define the size of the area at the bottom of the logical page which will automatically be skipped over by feeding the paper until the next TOF position.

(d) Range:

	ASCII	Decimal	Hexadecimal
n1	0 – 9	48 – 57	30 – 39

(e) Out of range:

The command will be ignored.

(f) Details:

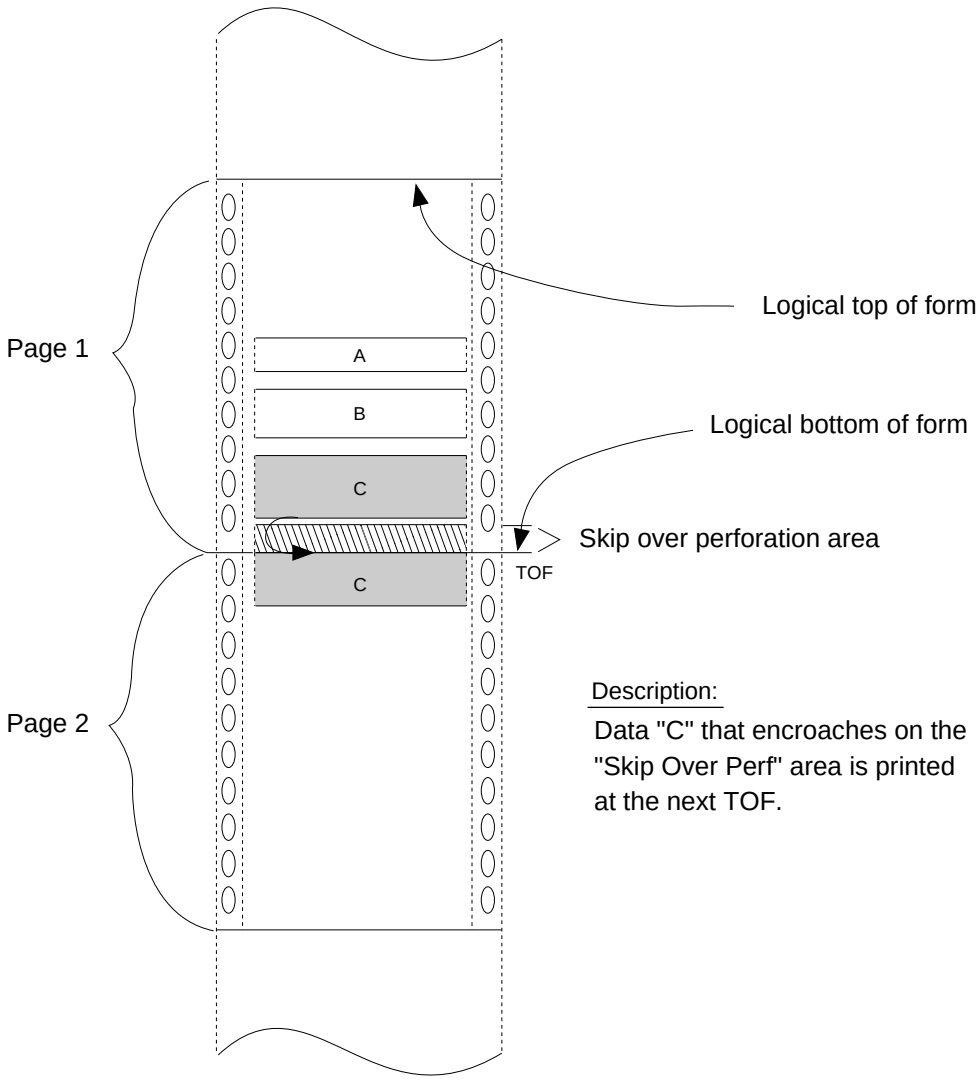
- If n = 0, the Auto-skip function is released.
- The distance that is skipped is twice the value of "n" multiplied by 1/6 inch (6 LPI).

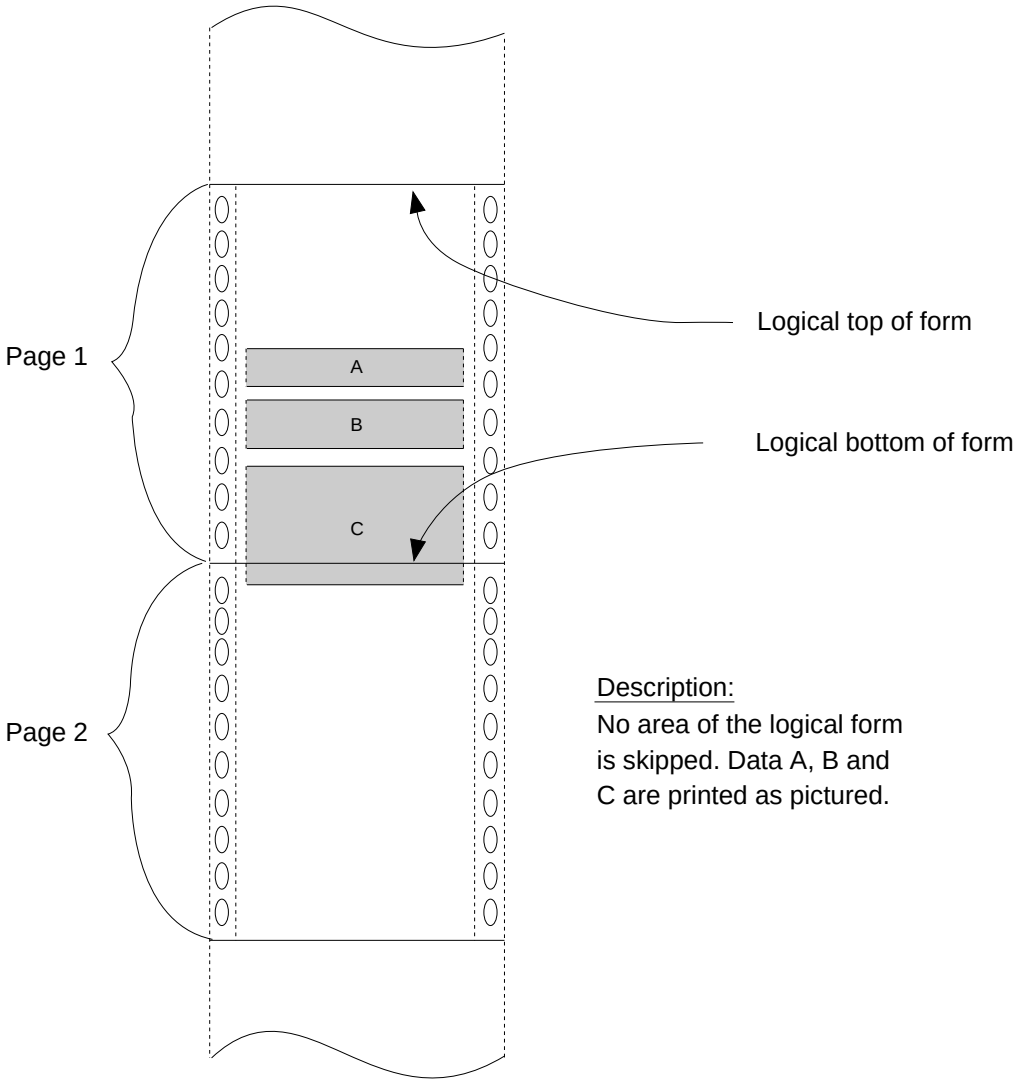
  "n" $\times$ 2 $\times$ 1/6 = Auto-skip distance.

- If Auto-skip (Skip Over Perforation) function is selected in Menu, the distance that will be skipped is 1 inch.
- When in the Hex-Dump secondary mode, the Auto-skip function will operate according to the MENU selection.
- Form length and TOF must be set before the Auto-skip area is defined.
- Refer to the illustration attachments for further details.
- Any printing operation which encroaches upon the bottom margin area, such as LF, Print Data + LF, Print Data + CR will cause the paper to be fed by skip over area length. On this next page, printing then will resume.

- When the current line spacing is defined by ESC ((8 LPI) or ESC % 9 n, (n/144 LPI) the auto skip function is performed when the remaining amount of the logical page is as follows...

Variable n1	inches (n1 × 2 × 1/6)	Equivalent no. of 6 LPIs	No. of steps of the LF motor	Comment
0	0	0	0	No skip
1	2/6	2	48	Skip
2	4/6	4	96	Skip
3	6/6	6	144	Skip
4	8/6	8	192	Skip
5	10/6	10	240	Skip
6	12/6	12	288	Skip
7	14/6	14	336	Skip
8	16/6	16	384	Skip
9	18/6	18	432	Skip





29) Top of form—define

(a) Code: ESC 4

(b) Compatibility: IBM III

(c) Function:

Logically “mark” the current vertical print position.

(d) Additional details:

- This command does not affect the CSF or SASF function.

30) Margins—define bottom margin (auto skip)

(a) Code: ESC N n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Sets the skip-over perforation to n lines, according to the current LF value.

(d) Range:

- Range n = 0 – 127 (Epson)
  0 – 255 (IBM)

(e) Out of range:

<Epson>

- The n value has to be less than the current form length.
  If n is equal to or greater than the form length, this function will be ignored.
- If n = 0 or n = 128, the last skip over perforation value will remain as previous value.
- If n > 127, bit 7 is cleared and length is set to resulting value of 4.

<IBM>

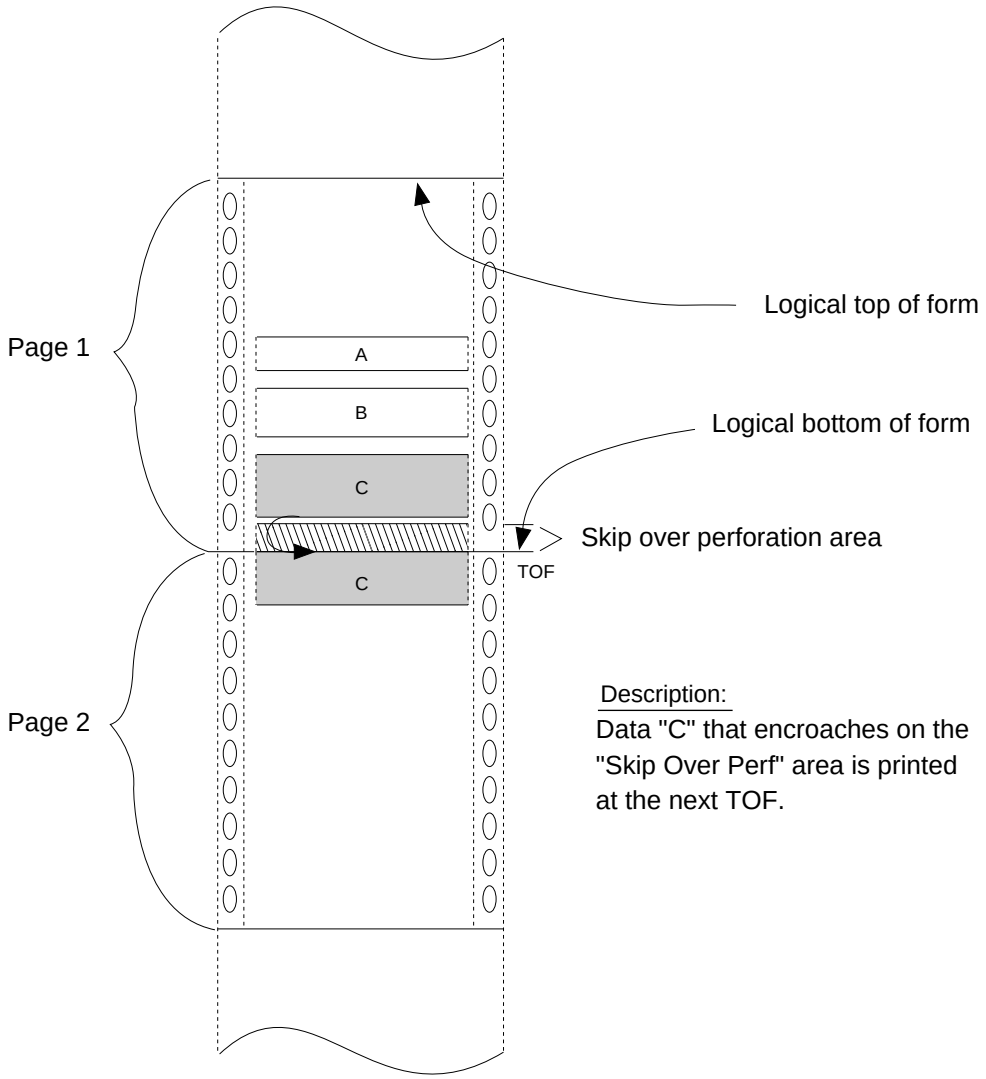
- The n value can be set regardless of paper length. (IBM)
- Not applicable—cannot receive value larger than 255 (FFH).

(f) Additional details:

- The skip over perforation will be reset by ESC O or page length set command.
- Skip over perforation distance will not be affected by a change in the line pitch.
- Entering to the area of skip over perforation by LF, VT, CR (with LF), ESC J n and auto line feed will cause the skip over perforation and feed to the top of form.

(g) Related functions:

- Line length value is based on ESC 0, ESC 2, ESC A n, or ESC 3 n, ESC 1, ESC % 9 n.



31) Margins—cancel bottom margin (auto skip)

(a) Code: ESC O

(b) Compatibility: EPS FX/IBM III

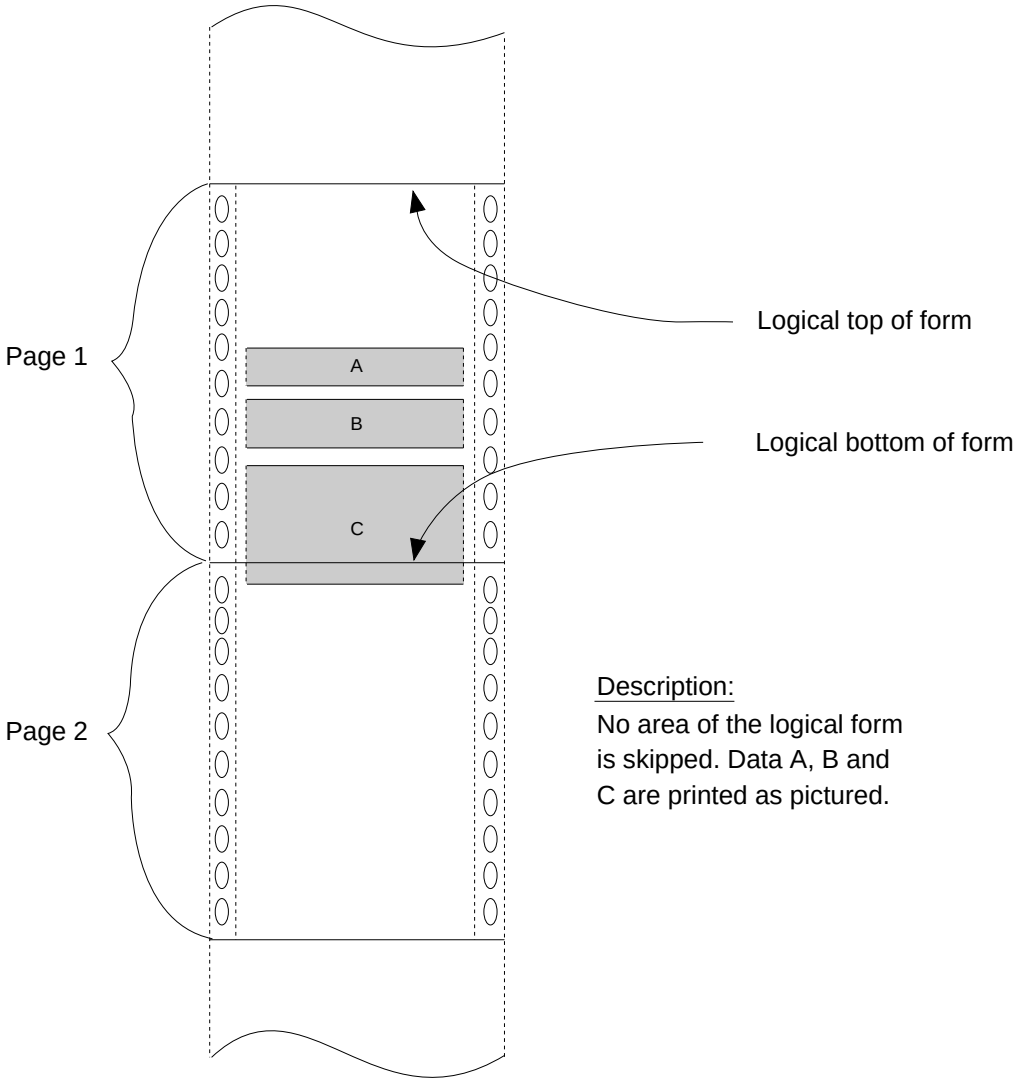
(c) Function:

Cancel Skip-Over Perforation.

(d) Additional details:

- Skip over perforation is cleared when power down/power up I Prime occurs.
- Skip over perforation is canceled when the form length is changed by the following codes:

ESC C n and ESC C nul n.



32) Vertical tabs—select channel

(a) Code: ESC / n

(b) Compatibility: EPS FX

(c) Function:

Select a vertical tab channel, specified by n.

(d) Range:

- Range: n = 0 – 7, n = 128 – 135

(e) Out of range:

- If n is not a number between 0 and 7 nor between 128 and 135, the command value will be ignored.

(f) Additional details:

- Within each channel there can be up to 16 vertical tabs which are independently set.
- In order to access the vertical tabs within each channel VT or CHR$(11) can be used.
- Tabs set by the ESC B command correspond to channel #0.

(g) Related functions:

- Vertical Tab

33) Vertical tabs — define tab stops

(a) Code: ESC B n1 n2 ... nk NUL

(b) Compatibility: EPS FX/IBM III

(c) Function:

Set the specified number of vertical tabs.

(d) Range:

- k specifies the number of vertical tabs.

  Range k = 1 – 16 (Epson)

  1 – 64 (IBM)

- n is the specific line number at which each vertical tab is to be set.

  Range n = 1 – 255

(e) Out of range:

- Value of k and n which exceed the maximum will be ignored.
- Paper will be loaded on printer even if the vertical tab setting exceeds the number of lines between TOFs (one page length).

(f) Additional details:

- To use n setting of 255 the line spacing must be set at less than 3/72 inch.
- Vertical tab stops are absolute, they are not changed by changing the line spacing (Epson). If the line feed amount value is changed after the vertical tab setting declaration, vertical tab stops will be executed according to the new line spacing (IBM). They remain at the same distance from TOF.
- The tab sequence must be terminated by CHR$(0) or any number less than the last tab or nk (Epson). The ESC sequence is terminated by CHR$(0). (IBM)
- The vertical tabs set by this command correspond to channel #0.
- n value must be increasing. n1<n2<n3< ... <nk.

(g) Related functions:

- ESC B nul will reset the TAB setting.

34) Vertical tabs—define tab stops in channels

(a) Code: ESC b n m1 m2 ... mk NUL

(b) Compatibility: EPS FX

(c) Function:

Set m vertical tabs for each channel n.

(d) Range:

- Range m = 0 – 255 (Bit 7 of m is ignored.)
- Range n = 0 – 7

(e) Out of range:

- if n>7, the command will be ignored.

(f) Additional details:

- The VFU has 8 channels n = (0 to 7) and up to 16 tab stops (m = 1 to 16). The vertical tab setting may exceed the number of lines between TOFs (one page length).
- This sequence must be terminated by CHR$(0), or any number less than mk.
- Tab settings are not affected by subsequent changes in line spacing.
- m value must be increasing. m1<m2<m3< ... <mk.

(g) Related functions:

- Upon power up n is set to channel no. 0. This means the same as ESC B.

35) Vertical tab—execute

(a) Code: VT

(b) Compatibility: EPS FX/IBM III

(c) Function:

Prints the data in the buffer and advance the paper to the next tab stop.

(d) Additional details:

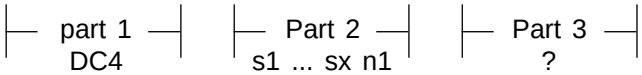
- If vertical tabs are default set, this command will function the same as LF.
- Executing more than the legal number of vertical tabs set will cause execution of the first vertical tab of the channel on the next page.

(e) Related functions:

- Double width mode set by ESC SO (Epson mode only) or SO will be reset.

36) Vertical tabs – define tab stops in channels (VFU)

(a) Code:



(b) Compatibility: ML

(c) Function:

- Define up to a total of 54 vertical tab stops in a maximum of 12 channels.

(d) Range:

- Variable — ASCII — DEC — HEX

  n1 (Channel Number) = 1 – < — 49 – 60 — 31 – 3C

- Argument

  TAB STOP (argument) = 1 to 54 occurrence

- Repeating constant

  s1 ... sx = 1 to 127 spaces

(e) Details:

- This command is composed of 3 parts ...

part 1 (initiator)	part 2 (argument)	Part 3 (terminator)
DC4	SP...SP n1 (repeat)	?

  — Part 1 is the initiator and is sent once.

  — Part 2 consists of a variable number of spaces, each representing 1 print line, and a tab channel number “n1”. This part can be sent multiple times.

  — Part 3 is the terminator, and is only sent once.

- The maximum number of spaces “SP” in all arguments is 127. This number is the total sum of all “SP”s even if the “SP”s are associated with difference arguments.
- The maximum number of tab stops (Part 2) or arguments is 54.
- The same tab channel can be defined more than once.
- VFU loading sets the top form.

37) Vertical tabs — execute

(a) Code: VT n

(b) Compatibility: ML

(c) Function:

- Initiate printing action; print data in the print buffer by causing a print block change, feed the paper to the next channel stop specified by “n”.

(d) Range:

channel number ↓

ASCII	Decimal	Hexadecimal
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C

(e) Out of range:

The command will be ignored.

(f) Logical limitation:

If a channel number which is not defined in the VFU load sequence, is specified in this command, this command will be ignored.

38) Paper-out sensor – enable

(a) Code: ESC 9

(b) Compatibility: EPS FX/IBM III

(c) Function:

Enables the paper out sensor, which activates an alarm lamp when 0.5 inch or less of paper remains.

(d) Additional details:

- Upon detection, the alram lamp is lit and the printer is deselected.
- Paper out detector can also be enabled by MENU.
- Manual Paper Out Override.
  - — While the paper end lamp is on, if the SEL switch is depressed, 1 line of data is printed, and line feed is executed.
  - — Paper override function is valid until the next TOF position is reached. After the next TOF is reached, the function becomes invalid.
  - — When SEL switch is depressed after paper is reset (paper end switch off), the following states return and the printer is in the select mode:
  - — SEL lamp light on.
  - — Paper lamp light off.
  - — I/F becomes select (receivable) state.
- While Paper Out Override is active, if multiple line feeds are received by the printer, the printer executes the line feeds until the TOF position is reached. If there are line feeds that couldn't be executed because the TOF was reached, they are "saved" and will execute after new paper is inserted.
- Unprinted data will be saved in the buffer and printed after paper is replaced and the SEL switch is depressed. If data in the print buffer is not printed because paper out was detected, the data will not be lost and can be printed after the paper is replaced and the SEL switch is depressed.

39) Paper-out sensor – disable

(a) Code: ESC 8

(b) Compatibility: EPS FX/IBM III

(c) Function:

Disables the paper out sensor.

(d) Additional details:

- Paper error detector can also be disabled by MENU.
- Printer prints up to TOF, then stops. Paper End LED turns ON.

40) Paper-out detection override—enable/disable

(a) Code: ESC E n

(b) Compatibility: ML

(c) Function:

- Enable/disable the paper out detection override function in which even though the printer has detected that only 1 inch of paper remains to be printed on, printing action can still execute until the next TOF is reached.

(d) Range:

n = 1, Paper Out Detection Override = Disabled.

n < > 1, Paper Out Detection Override = Enabled.

(e) Out of range:

The command will be ignored.

(f) Details:

- When the printer's paper sensor switch detects that only 1 inch of paper remains in the platen path and the "Paper Out Detection Override" function is disabled (i.e. the printer is in the normal paper detection mode), the printer... – stops printing
  - — immediately turns on PE/FAULT signals
  - — printer = Off line
  - — SEL LED = OFF
  - — ALARM LED = On (Paper end is detected).
- While this condition exists, the user can continue to print by pressing the SEL switch. When this happens, the SEL LED = on and only one line of text is printed followed by a LF. After the 1 line is printed the SEL LED = off and the printer returns to the deselect state it was in before the SEL switch was pressed. This process can be repeated until the next TOF is reached.
- During Paper-out detection override process (described above), if continuous LFs are executed, the printer will advance the paper until the next TOF is reached. Once the next TOF is reached, all remaining feeds will be negated.
- When the Paper Out Detection Override = enabled, when 1 inch of paper is detected in the platen path, the paper-out condition is overridden, and printing continues normally. If there is enough data, the printer will continue to print beyond the physical edge of the paper and will continue to print on the platen until the next TOF is reached.
- The alarm (paper-out) LED will turn on regardless of if the Paper-Out Override function is enabled or disable.
- The TOF will be maintained even if paper out switch is disabled.
- This function is not available when the CSF is connected.

41) Cut-sheet feeder—single sheet insert

(a) Code: ESC EM I

(b) Compatibility: EPS FX/IBM III

(c) Function:

Feed a single cut-sheet into the printer.

(d) Details:

- This command starts printing and performs carriage returns regardless of the paper mode.
- If paper is already loaded, the printer will eject that sheet and feed another sheet to the TOF position.
- If there is data in the print buffer and paper is already loaded, this command causes the data to be printed, the current sheet ejected and then the new sheet inserted.

42) Cut-sheet feeder—single sheet eject

(a) Code: ESC EM R

(b) Compatibility: EPS FX/IBM III

(c) Function:

If CSF is installed, paper already in the platen path is ejected.

(d) Additional details:

- This command starts printing and performs carriage returns regardless of the paper mode.
- An LF code at the end of the page automatically causes the next sheet to be loaded.
- If data is in the print buffer, it is printed before the sheet is ejected.

43) Cut-sheet feeder—single sheet insert

(a) Code: ESC S

(b) Compatibility: ML

(c) Function:

FEED a single Cut-Sheet into the printer.

(d) Details:

- If CSF is not installed, this command is ignored.
- If paper is already loaded, the printer will eject that sheet and feed another sheet to the TOF position.
- If there is data in the print buffer and paper is already loaded, this command causes the data to be printed, the current sheet ejected and then the new sheet inserted.

44) Cut-sheet feeder—single sheet eject

(a) Code: ESC V

(b) Compatibility: ML

(c) Function:

Eject the cut-sheet paper that is currently in the platen path.

(d) Details:

- This command is ignored when CSF is not installed.
- Any vertical feed command (LF, VT, FF, Direct Skip etc.) that advances the logical page beyond the physical page will cause the next sheet to be loaded.
- If data is in the print buffer, it is printed before the sheet is ejected.

45) Cut-sheet feeder—dual bin CSF bin select

(a) Code: ESC EM n

(b) Compatibility: ML

(c) Function:

- Select a sheet bin on Dual Bin CSF

(d) Details:

n = 01H, 31H, 81H, B1H Set a sheet bin on Dual Bin CSF to bin 1

n = 02H, 32H, 82H, B2H Set a sheet bin on Dual Bin CSF to bin 2

(e) Out of range

The command will be ignored.

(f) Details:

- This command is ignored when Dual Bin CSF is not installed.
- On receiving this command, sheet is inserted from the bin selected.
- This command cannot function to perform sheet insertion/ejection.
- In the following cases, the default bin selected by the menu is set:

  Turning on the power

  Receiving I-PRIME signals

  Receiving the ESC CAN command

46) Dual bin CSF bin select

(a) Code: ESC EM n

(b) Compatibility: EPS FX/IBM III

(c) Function:

Form loading bin is set for dual bin CSF.

(d) Range: n = 01H, 31H, 81H, B1H ... The form loading bin from dual bin CSF is set on bin 1.

n = 02H, 32H, 82H, B2H ... The form loading bin from dual bin CSF is set on bin 2.

(e) Out of range:

In case of out of range, this command is invalid, and the previously established mode remains.

(f) Additional details:

- The loading/ejection of the form is not performed on reception of the command.
- The form is loaded from the bin set for form loading after reception of this command.
- This command is valid regardless of the paper mode. The command, however, functions when the dual bin CSF is installed.

47) Composite command for setting line feed quantity

ESC DLE H Pno A1 A2 P1 P2 P3

Code: 1B 10 48 in hexadecimal

27 16 72 in decimal

Functions:

(1) This command is one of OKI-unique commands.

(2) This command specifies the quantity of line feeding by parameter A1 (Basic LF Quantity) and feeds paper by the specified quantity.

(3) Valid ranges and meanings of parameters

(a) Pno: Specifies the length (in bytes) of parameters following the “Pro” parameter.

The most significant bit (MSB) is voided.

00H < Pno < FFH

Pno < 05H:This command is voided and the number of bytes specified by the “Pno” parameter are discarded.

(b) A1: Specifies a basic line feeding pitch. The most significant bit (MSB) is voided.

A1=00H, 30H 1/60" pitch (Reserved)

A1=01H, 31H 1/72" pitch

A1=02H, 32H 1/144" pitch (Reserved)

A1=03H, 33H 1/180" pitch

A1=04H, 34H 1/216" pitch

A1=05H, 35H 1/360" pitch (Reserved)

When the other parameter value is specified, the number of bytes specified by the “Pno” parameter are discarded.

(c) A2: Specifies setting of parameters or execution of this command.

The most significant bit (MSB) is voided.

00H < A2 < FFH

A2 = even number: Sets the quantity of line feeding.

A3 = odd number: Feeds paper by the specified quantity of line feeding.

(d) P1 to P3: Specifies the quantity of line feeding according to the specified line feed pitch (by parameter A1). Each parameter uses the lower four bits of a byte to indicate a value of 1 to 9. (The higher four bits of each byte are ignored.)

P1: Hundreds digit of the LF quantity

P2: Tens digit of the LF quantity

P3: Ones digit of the LF quantity

The LF quantity must always be three digits long.

(4) This command can be entered anywhere on a line.

(5) This command will not set TOF.

(6) When an even value is specified for the A2 parameter (to set parameters of this command), the following items are enabled:

(a) The specified LF quantity is referenced by the following operations: LF, VT, CR (with LF), automatic carriage return, setting of page length, perforation skip, etc.

(b) The LF quantity of “000” can be specified (by parameters P1 to P3).

(c) The printer does not start printing.

(d) The LF quantity specified on the menu is used in the following cases:

(d-1) When the printer receives an INITIALIZE command (ESC @) (or when “Reset Inhibit” on the menu is “No”)

(d-2) When the printer receives a software I-PRIME command (ESC } NUL)

(d-3) When the printer receives an Emulation Change command (ESC { Pn) (except for identical simulation)

(d-4) When the printer receives an I/F I-PRIME-N signal (or when “I-Prime” on the menu is not “Invalid”)

(d-5) When a setting is made on the menu

(d-6) When the printer is reset by a switch

(d-7) When the printer is powered on

(d-8) When the printer receives a Menu Factory Value Load command (ESC DLE 02H)

(d-9) When the printer receives a Menu Set command (ESC DLE D)

(7) When an odd value is specified for the A2 parameter (to execute the command), the printer performs the following:

(a) Reads data in the print buffer, prints it out, then moves the print head to the top of the next line.

(b) Releases the 1-line Wide mode by SO/ESCSO.

(c) Prints and return the print head to the top of the line even when an LF quantity of “000” is specified by parameters P1 to P3.

(d) Skips to the next TOF when a Perforation Skip command is entered.

(e) The LF quantity is not affected by the specified LF quantity.

(f) Moves the print head to the left margin to indicate the next print position when the Incremental Print mode is set.

12.3 Symbols Sets

1) IBM char set 1—select
   (a) Code: ESC7
   (b) Compatibility: IBM III
   (c) Function:

   Select the IBM Character Set 1.

   (d) Details:
   - See attachments for “Symbol Set Illustrations” for definition of the locations of Control Codes, Trapped Codes and Printable Characters.

2) IBM char set II—select
   (a) Code: ESC 6
   (b) Compatibility: IBM III
   (c) Function:

   Select IBM character set 2

   (d) Details:
   - See attachments for “Symbol Set Illustrations” for definition of the locations of Control Codes, Trapped Codes and Printable Characters.

3) IBM char set III (all char)—continuous—select
   (a) Code: ESC\n1 n2
   (b) Compatibility: IBM III
   (c) Function:

   Select IBM character Set II. (All Characters Chart).

   (d) Range:
   - n1 and n2 is equal to the total number of characters that are desired to be printed.

     ie: total count = n1 + (n2*256)

   (e) Details:
   - All codes including control codes, specified after this command is sent are printable characters.
   - After the character count is reached, the printer no longer interprets the control codes as printable characters.

4) IBM char set III (all char)—print one char only
   (a) Code: ESC^
   (b) Compatibility: IBM III
   (c) Function:

   Select the IBM Set III (All characters chart) and print only one character.

   (d) Additional details:
   - This command functions exactly the same as the “ESC\n1 n2” where n1 = 1 and n2 = 0.

5) Symbol set—OKIDATA-standard—select

(a) Code: ESC ! 0

(b) Compatibility: ML

(c) Function:

Select the OKIDATA—Standard Symbol set.

(d) Details:

- Refer to the illustration attachment's "Symbol Set Charts" for details on the character's shape and associated locations.
- Description of OKIDATA—Standard symbol set

Location	Description	count
00H – 1FH	ASCII Control Codes	32
20H – 7FH	ASCII Printable Characters	96
90H – 9FH	ASCII Control Codes	32
A0H – FFH	IBM Printable Characters	96

- 16 locations in this character set are used as International Language substitute locations. When an international language is selected by the ESC ! n1 command, the appropriate International language character pattern is printed.

6) Symbol set—Okidata-Block—select

(a) Code: ESC ! 1

(b) Function:

Select the Okidata – Block Graphics symbol set.

(c) Details:

- Refer to the illustration attachment's "Symbol Set Charts" for details on the character's shape and associated locations.
- Description of OKIDATA—Block Graphics symbol set

  – 7 Bit Mode

Location	Description	count
(SI Side)		
00H – 1FH	ASCII Control Code	32
20H – 7FH	ASCII Printable Characters	96
(SO Side)		
00H – 1FH	ASCII Control Codes	32
20H – 5FH	OKIDATA Block Graphics	96
60H – 7FH	Trapped Codes	32

— 8 Bit Mode

Location	Description	count
00H – 1FH	ASCII Control Codes	32
20H – 7FH	ASCII Printable Characters	96
80H – FFH	OKIDATA Block Graphics	128

- 16 locations in this character set are used as International Language substitute locations. When an International language is selected by the ESC ! n1 command, the appropriate International language character pattern is printed.

7) Symbol set—OKIDAT-IBM — select

(a) Code: ESC ! 2

(b) Compatibility: ML

(c) Function:

Select the OKIDATA — IBM symbol set.

(d) Details:

- Refer to the illustration attachment's "Symbol Set Charts" for details on the character's shape and associated locations.
- Description of OKIDATA—IBM symbol set

Location	Description	Count
00H – 02H	ASCII Control Code	3
03H – 06H	IBM Printable Characters	4
07H – 14H	ASCII Control Code	14
15H	IBM Printable Character	1
16H – 1FH	ASCII Control Code	10
20H – FFH	IBM Printable Characters	224

- 16 locations in this character set are used as International language substitute locations. When an International Language is selected by the ESC ! n1 command, the appropriate International Language character pattern is printed.

8) International language char set—select

(a) Code: ESC R n

(b) Compatibility: EPS FX

(c) Function:

Selects an international language character set and code page specified by the number n.

(d) Range:

- Character set: n = decimal number 0 to 14, 64
- Code page: n = decimal number 26 to 28, 43

(e) Out of range:

- Command is ignored.

(f) Details:

- Definition of value of “n”.

ASCII	Hex	Dec	LANGUAGE	Hex	Dec	Code page
NULL	00	0	American	15		Cyrillic II-866
SOH	01	1	French	16		Polska Mazovia
STX	02	2	German	17		ISO Latin 2
ETX	03	3	British	18		Serbo Croatic I
EOT	04	4	Danish 1	19		Serbo Croatic II
ENQ	05	5	Swedish	1A		Multilingual 850
ACK	06	6	Italian	1B		Norway 865
BELL	07	7	Spanish 1	1C		Portugal 860
BS	08	8	Japanese	1D		Turkey
HT	09	9	Norwegian	26		Greek 437
LF	0A	10	Danish II	27		Greek 928
VT	0B	11	Spanish II	28		Greek 851
FF	0C	12	Latin America	29		Greek 437 CYPRUS
CR	0D	13	French Canadian	2A		ECMA-94
SO	0E	14	Dutch	2B		Canada French
	0F		Swedish II	2C		Cyrillic I-855
	10		Swedish III	2D		Cyrillic II-866
	11		Swedish IV	2E		East Europe Latin II-852
	12		Turkish	2F		Greek 869
	13		Swiss I	31		Windows East Europe
	14		Swiss II	32		Windows Greek
				33		Latin 5 (Windows Turkey)
				34		Windows Cyrillic
				36		Hungarian CWI
				37		Kamenicky (MJK)
				39		Turkey 857
				3C		Hebrew NC (862)
				3D		Hebrew OC
				3E		Windows Hebrew
				42		Ukrainian
				43		ISO Latin 6 (8859/10)
				44		Windows Baltic
				48		Bulgarian
				4A		Baltic 774
				40H	64	Publisher

- See the attached illustration “International Language – Character Substitutions – Epson” for definition of character shape and location. Note that row 14, “French-Canadian”, row 15 “Dutch”, columns 3, 5, and 11 are additional and are not found in the authentic Epson FX printers.

9) International language character set – select

(a) Code: ESC ! n

(b) Compatibility: IBM III/ML

(c) Function:

Select International Language character set according to the n value specified.

(d) Range:

- n = decimal 64 – 76, 90

(e) Out of range:

- Command is ignored.

(f) Details:

- Definition of values of “n”.

ASCII	Hex	Dec	LANGUAGE
@	40	64	American Slashed Zero
A	41	65	American Unslashed Zero
B	42	66	British
C	43	67	German
D	44	68	French
E	45	69	Swedish
F	46	70	Danish
G	47	71	Norwegian
H	48	72	Dutch
I	49	73	Italian
J	4A	74	French Canadian
K	4B	75	Spanish
L	4C	76	Swedish II
M	4D	77	Swedish III
N	4E	78	Swedish IV
O	4F	79	Turkish
P	50	80	Swiss I
Q	51	81	Swiss II
Z	5A	90	Publisher

- See the attached illustration “International Languages – Character Substitutions-IBM/ML” for definition of character shape and location.

10) Code page set—select

(a) Code: ESC [T Ln Hn NUL NUL Hcp Lcp NUL

(b) Compatibility: IBM III/ML

(c) Function:

Selects the code page.

(d) Range:

- Ln, Hn specifies the subsequent data amount

  Data amount = (Ln + Hn*256)

- Ln, Hn = 0 to 255

  When Ln = 0, $0 \leqq Hn \leqq 3$ are specified, the currently selected code page will remain effective and this command is discarded.

- NUL = 0 to 255

- Hcp, Lcp are used to specify the code page ID number.

  ID No. = (Hcp*255 + Lcp)

- Hcp, Lcp = 0 to 255

(e) Out of range:

The command is discarded.

(f) Additional details:

- No international language character conversion is performed except for the USA character code.

- The ID number causes the printer to select the corresponding code page directly.

ID (Hcp, Lcp)	Code Page
437	USA
774	Baltic 774
850	Multilingual
852	East Europe Latin II-852
855	Cyrillic I-855
857	Turkey 857
860	Portugual
862	Hebrew NC (862)
863	Canada French
865	Norway
866	Cyrillic II-866
869	Greek 869
895	Kamenicky (MJK)
1008	Greek 437
1009	Greek 928
1011	Greek 437 CYPRUS
1012	Turkey
1013	Cyrillic II-866
1014	Polska Mazovia
1015	ISO Latin 2
1016	Serbo Croatic I
1017	Serbo Croatic II
1018	ECMA-94
1019	Windows East Europe
1020	Windows Greek
1021	Windows Turkey
1022	Windows Cyrillic
1024	Hungarian CWI
1027	Ukrainian
1029	ISO Latin 6 (8859/10)
1030	Hebrew NC
1031	Hebrew OC
1032	Windows Hebrew
1034	Windows Baltic
1072	Bulgarian

11) Slant/graphics character table—select

(a) Code: ESC t n

(b) Compatibility: EPS FX

(c) Function

Select the type of characters, slant or graphics, that will print when codes 128D-255D are specified.

(d) Range:

- n = 00H ... selects slant character table
- n = 01H ... selects Epson Graphics character table.

(e) Additional details:

- ESC 4 selects italics printing regardless of this command.

12) Epson—control codes or printable characters—ON/OFF

(a) Code: ESC / n

(b) Compatibility: EPS FX

(c) Function:

Enables the printer to print the characters stored in decimal locations 0-6, 16-17, 21-23, 25-26, 28-31 and 128-134, 144-145, 149-151, 153-154, 156-159 as printable characters, not control codes.

(d) Range:

- n = 1 Interprets code 0-6, 16-17, 21-23, 25-26, 28-31 and 128-134, 144-145, 149-151, 153-154, 156-159 as printable characters.
- n = 0 Interprets code 0-6, 16-17, 21-23, 25-26, 28-31 and 128-134, 144-145, 149-151, 153-154, 156-159 as non-printable characters, i.e. control codes.

(e) Additional details:

- This function allows the user to store User-defined characters in locations that normally correlate to control codes.

13) Epson—control codes or printable characters—ON

(a) Code: ESC 6

(b) Compatibility: EPS FX

(c) Function:

Enables the printer to interpret the decimal locations 128 – 159, 255 as printable characters, not as control codes.

(d) Additional details:

- This function allows the user to store User-defined characters in locations that normally correlate to control codes.

14) Epson—control codes or printable characters—OFF

(a) Code: ESC 7

(b) Compatibility: EPS FX

(c) Function:

Cancels ESC 6, decimal locations 128-159, 255 are interpreted as control codes, not as printable characters.

(d) Additional details:

- This function allows the user to store User-defined characters in locations that normally correlate to control codes.

15) Epson—italic character set—select

(a) Code: ESC 4

(b) Compatibility: EPS FX

(c) Function:
Select the alternate character set which is composed of italicized character.

(d) Additional details:

- Italic characters are printed using a slat algorithm (See illustration).
- See priority table for detail command combination.
- Italic characters may be overlapped on the next character cell.

(e) Related functions:

- This mode can also be selected by the ESC ! n command.

16) Epson—italic character set—cancel

(a) Code: ESC 5

(b) Compatibility: EPS FX

(c) Function:

Cancel the Alternate Character Set (Italics characters).

(d) Related functions:

- This mode can also be reset by the ESC ! n command.

12.4 Font Description

1) Print quality—select mode—UTLINLQ
   (a) Code: ESC × n
   (b) Compatibility: EPS FX
   (c) Function:
   Either Utility or NLQ print quality mode.
   (d) Range:
   • Range n = 01H, 31H, 81H, B1H selects NLQ character font.
   • Range n = 00H, 30H, 80H, B0H selects Utility character font.
   (e) Out of range:
   • This command will be ignored when the value is:
   02H – 2FH or 32H – 7FH or 82H – AFH or B2H – FFH
   (f) Additional details:
   • NLQ and UTILITY Modes are printed in 10, 12, 15, 17.1, and 20 CPI.
   • Utility 10 CPI mode is the factory default setting.
   • See attachments for UTL & NLQ Print Mode/Features Combination Priority Chart

2) Print quality—select HSD
   (a) Code: ESC # 0
   (b) Compatibility: IBM III
   (c) Function:
   Select High Speed Draft Character Set.
   (d) Details:
   • If inter-character clearance is defined while the High Speed Draft (HSD) mode is selected, additional blank dot columns will be suppressed.
   • The HSD mode will be suppressed during the proportional print mode.
   • Accessible addresses:
   03H — 06H
   15H
   20H — 7FH
   80H — AFH
   E0H — F3H
   F6H — FFH
   Other areas will not be printed in High Speed draft mode.
   • See attachments for UTL & NLQ Print Mode/Features Combination Priority Charts.

3) Print quality—select HSD
   (a) Code: ESC (n
   (b) Compatibility: EPS FX

(c) Function:

Select High Speed Draft Character Set.

(d) Range: n = 00H, 30H, 80H, or B0H HSD is selected.

n = any other value The current mode will remain effective.

(e) Details:

- If inter-character clearance is defined while the High Speed Draft (HSD) mode is selected, additional blank dot columns will be suppressed.
- The HSD mode will be suppressed during the proportional print mode.
- Accessible addresses:

  03 — 06H

  15H

  20H — 7FH

  80H — AFH

  EOH — F3H

  F6H — FFH

  Other addresses will not be printed in High Speed draft mode.
- See attachments for UTL & NLQ Print Mode/Features Combination Priority Charts.

4) Print quality—select font

(a) Code: ESC / n

(b) Compatibility: IBM III

(c) Function:

Select print mode according to the value of n.

(d) Range:

Pn is set as 0 (00H) ≦ Pn ≦ 255 (FFH)

	MSB value of n LSB	Print Mode
	XXXX0000B	Print following letters in ROM UTL.
	XXXX0001B	Print following letters in Fast Font (HSD 12 CPI).
	XXXX0010B	Print following letters in ROM NLQ (Sans Serif)
E	XXXX0011B	Print following letters in ROM NLQ II (Courier).
S	XXXX0100B	Print following letters in DLL UTL.
C	XXXX0101B	Print following letters in Fast Font (DLL UTL 12 CPI).
I	XXXX0110B	Print following letters in DLL NLQ.
	XXXX0111B	Print following letters in DLL NLQ II.
	XXXX1011B	Print following letters in Alternate ROM NLQ II (Courier).
	XXXX1111B	Print following letters in Alternate DLL NLQ II.

(e) Out of range:

- This command will be ignored and the last set will remain.

5) Print quality—select high speed draft

(a) Code: ESC # 0

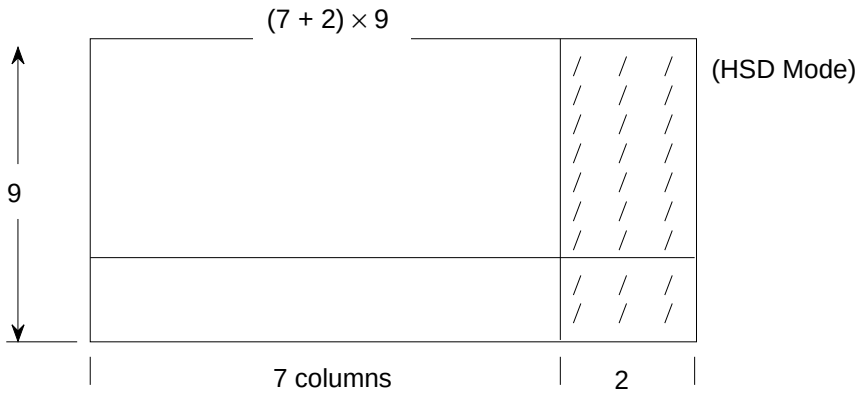
(b) Compatibility: ML

(c) Function:

Select the High Speed Draft (HSD) Print Quality Mode which prints a print speed of 433 CPS, for fast througput.

(d) Details:

- The HSD mode can be combined with all other print features except proportional and inter-character clearance print modes.
- The Cell Matrix is as follows:



- Only normal Alpha-numeric printable characters can be printed in the HSD mode.
- HSD mode is mutually exclusive with the other print quality modes, NLQ and utility.
- Refer to the illustration attachments “Print Mode/Feature Combination Chart” for details of legal combination of Print Quality Modes and Print Features.
- HSD prints in one pass of the print head.

6) Print quality—select utility

(a) Code: ESC 0

(b) Compatibility: ML

(c) Function:

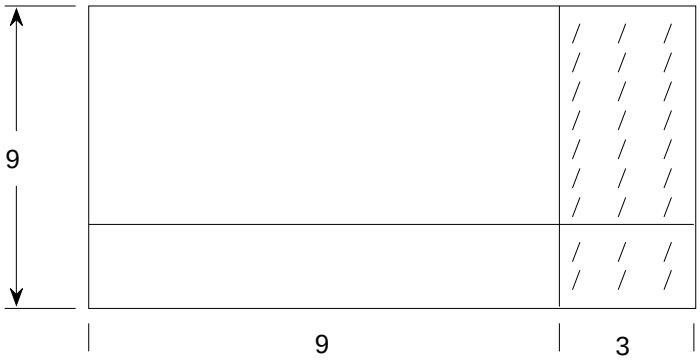
Select the Utility Print Quality Mode which prints at a print speed of 325 CPS and provides speed with good print quality.

(d) Details:

- The Utility (UTL) Print Quality Mode is considered the “normal” mode of printing and can be combined with most Print Features.

- The Cell Matrix as follows:

(9 + 3) x 9



- Utility mode is mutually exclusive with the other print quality modes, NLQ and HSD.
- Refer to the illustration attachments “Print Mode/Features Combination Chart” for details of legal combinations of Print Quality Modes and Print Features.
- UTL prints in one pass of the print head.

7) Print quality—select NLQ

(a) Code: ESC 1

(b) Compatibility: ML

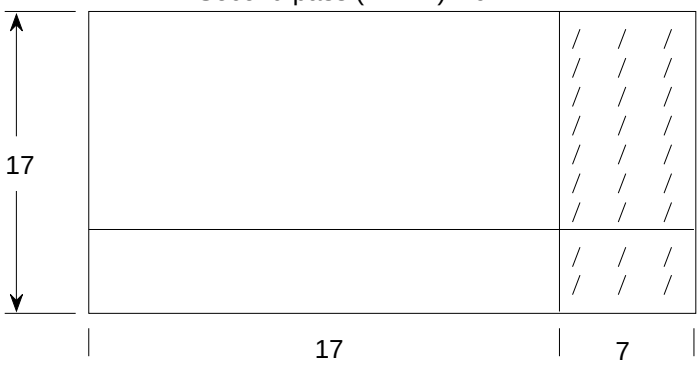
(c) Function:

Select the Near Letter Quality (NLQ) Print Quality Mode which prints at a speed of 81 CPS, but provides the best print quality.

(d) Details:

- NLQ Print Quality is achieved by printing twice the number of dots, both vertically and horizontally, compared to UTL Print Quality in the same physical space.
- The Cell Matrix is as follows:

First pass (17 + 7) x 9
Second pass (17 + 7) x 9



- NLQ is mutually exclusive with the other print quality modes, UTL and HSD.
- Refer to the illustration attachments “Print Mode/Features Combination Chart” for details of legal combinations of Print Quality Modes and Print Features.
- NLQ prints in two passes of the print head. The second pass is shifted downward 1/144 inch.
- NLQ is printed in 10, 12, 15, 17.1 and 20 CPI.

8) Print quality—select NLQ – Gothic

(a) Code: ESC 3

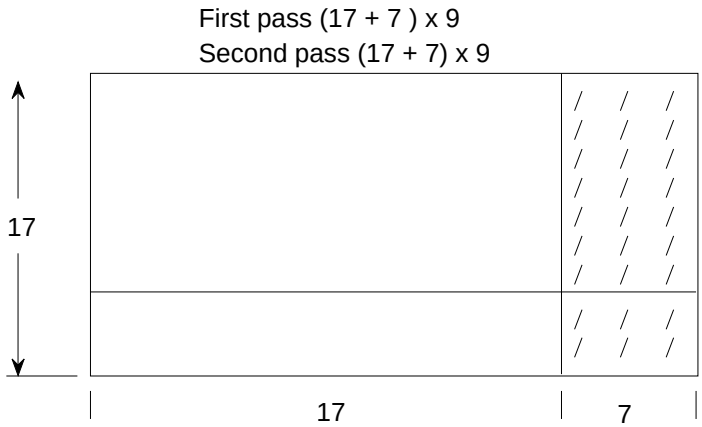
(b) Compatibility: ML

(c) Function:

Select the Near Letter Quality (NLQ) Print Quality Mode which prints a Gothic typestyle at a speed of 81 CPS.

(d) Details:

- NLQ Print Quality is achieved by printing twice the number of dots, both vertically and horizontally, compared to UTL Print Quality in the same physical space.
- The Cell Matrix is as follows:



- NLQ Gothic is mutually exclusive with the other print quality modes, NLQ Courier, UTL and HSD.
- Refer to the illustration attachments “Print Mode/Features Combination Chart” for details of legal combinations of Print Quality Modes and Print Features.
- NLQ prints in two passes of the printhead. The second pass is shifted downward 1/144 inch.
- NLQ is printed in 10, 12, 15, 17.1, and 20 CPI.

9) Custom font—select UTL DLL font

(a) Code: ESC 2

(b) Compatibility: ML

(c) Function:

(d) Details:

- 256 characters can be loaded. However, DLL characters fonts cannot be printed since the following character codes are handled as a function.

  00H to 02H, 07H to 14H, 16H to 1FH

- Since UTL custom characters (DLL) are stored in RAM, they will be lost if power to the printer is turned off.

- UTL Custom Characters definition commands are:

  ascender characters = ESC % A m n1 ... n11

  descender characters = ESC % D m n1 ... n11

  copy ROM to RAM

- This command is equivalent to the composite command (ESC.&.n:)

  where

  n3 – n2 = 1

- If an International language is specified (ESC ! n command) while the UTL Custom Character Font is active, the International language does not become effective until the UTL Custom Character Font is deactivated.
- If an International language is specific (ESC ! n command) while the UTL custom character font is active, the commands that deactivate UTL Custom Characters have the following affect on the International Language command ...

command to deactivate	ESC 2	results
UTL	(ESC 0)	Intr'l Lang is active and Print Quality = UTL
NLQ	(ESC 1)	Intr'l Lang is active and Print Quality = NLQ
NLQ-DLL	(ESC 7)	Intr'l Lang is not activated and Synthetic NLQ Quality Custom Characters are selected.

10) Custom font—select synthetic-NLQ DLL font

(a) Code: ESC 7

(b) Compatibility: ML

(c) Function:

Select the NLQ print quality custom character font (DLL) which is synthesized from the UTL custom character data.

(d) Details:

- 256 characters can be loaded. However, DLL characters fonts cannot be printed since the following character codes are handled as a function.

  00H to 02H, 07H to 14H, 16H to 1FH

- This font is created by reading the UTL custom character data, that was previously loaded, and algorithmycally synthesizing extra dots so that the effective print quality of the characters is NLQ quality. Refer to the "Illustration/Attachments" for details.
- The synthetic NLQ custom character font is deactivated by selection of either UTL (ESC 0), NLQ (ESC 1) or UTL Custom characters (ESC 2).
- If an International language is specified (ESC ! n command) while the Synthetic NLQ custom character font is active, the commands that deactivate Synthetic custom characters have the following affect on the International Language command...

command to deactivate	ESC 2	results
UTL	(ESC 0)	Intr'l Lang is active and Print Quality = UTL
NLQ	(ESC 1)	Intr'l Lang is active and Print Quality = NLQ
UTL-DLL	(ESC 2)	Intr'l Lang is not activated and UTL Print Quality Custom Characters are selected.

11) Typestyles—select

(a) Code: ESC k n

(b) Compatibility: EPS FX

(c) Function:

Select a NLQ typestyle.

(d) Range:

- n = 00H, 30H, 80H, B0H Courier
- n = 01H, 312H, 81H, B1H Gothic

(e) Out of range:

- This command will be ignored if n does not equal one of the above values.

12) Custom font—create—copy ROM data to RAM

(a) Code: NUL n NUL

(b) Compatibility: EPS FX

(c) Function:

Access the pre-defined ROM character patterns as if they were copied to DLL RAM.

(d) Range:

- The number n indicates the NLQ font typeface number when they are copied to RAM.

  n = 00H, 80H NLQ Courier

  n = 01H, 81H NLQ Gothic

(e) Additional details:

- This command actually does not cause the pre-defined ROM character data to be transferred to the RAM DLL area, rather, for all characters (addresses) not defined by the user, the data is actually read from ROM. The only time that the data is read from RAM is when the character pattern is created by the user. By the user creating the character data and defining its address, this causes the F/W to re-route the “data read” from the normal ROM data, to the DLL RAM data.
- Any previously defined DLL data will be erased if this command is executed.
- The character patterns are stored in the volatile RAM.

13) Custom font—create—copy ROM data to RAM

(a) Code: ESC $

(b) Compatibility: IBM III/ML

(c) Function:

Access the pre-defined ROM character patterns as if they were copied to DLL RAM.

(d) Additional details:

- This command actually does not cause the pre-defined ROM character data to be transferred to the RAM DLL area, rather for all characters (addresses) not defined by the user, the dat is actually read from ROM. The only time that the data is read from RAM is when the character patter is created by the user. By the user creating the character data and defining its address, this causes the F/W to re-route the “data read” from the normal ROM data, to the DLL RAM data.
- Any previously defined DLL data will be erased if this command is executed.

- The character patterns are stored in the volatile RAM.
- Both Utility and NLQ Courier ROM characters are “copied” to DLL RAM.

14) Custom font—create char pattern—UTL DLL

(a) Code:

part 1	part 2	part 2’
ESC & m n1 n2	a d1 ... d11	a d1 ... d11

(b) Compatibility: EPS FX

(c) Function:

Define up to 256 character patterns using a 11H × 8V matrix and store the pattern in RAM.

(d) Range:

- m = decimal 0
- n1 = decimal 0 – 255
- n2 = decimal 0 – 255
- a = decimal 0 – 255, decimal representation of a 8 bit binary number (see explanation below).
- d1 = decimal 0 – 255
- d2 = decimal 0 – 255

(e) Variable purpose:

- m = area of RAM in which to store DLL, currently only 1 area is available (i.e. “m” is a constant value equal to zero).
- n1 = Starting character (address) to be redefined by the user.
- n2 = Ending character (address) to be redefined by the user.
- a = attribute byte “a” bit definition (bits 7-0) ...

  b7 = 1 = ascender, dot rows 1-8

  0 = descender, dot rows 2-9

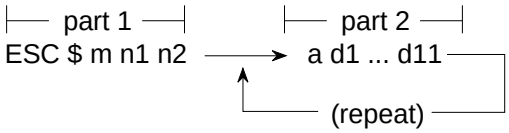
  b6-b4 = Interpreted as a binary number. Specifies the left offset (starting column to print) of the first dot column to be printed. Used to reduced leading white space. Maximum of 7 bytes can be ignored. The count begins with byte #1.

  b3-b0 = Interpreted as a binary number. Specifies the ending column to print of the last column of data to be printed. The difference between this number and the left-offset is equal to the character’s width. Maximum ending column is 12.

- d1-d11 = column data, each column of data = 1 byte. Column #1 = byte #1.

(f) Additional details:

- This command is composed of 2 parts ...



Part 1, which is “ESC & m n1 n2” is only sent once, while part 2, “a1d1 ... d11” is repeated for each character pattern that is desired to be defined.

- Character locations that can be defined:

  1. normal operation DLL

     (20)H — (7F)H 96 characters

     (A0)H — (FF)H 64 characters

     Total 160 characters

  2. with ESC 6 (print code expansion area) ...

     (20)H — (7F)H 96 characters

     (80)H — (9F)H 32 characters

     (A0)H — (FF)H 64 characters

     Total 192 characters

  3. with ESC I (print code expansion area) ...

     (00)H — (1F)H 32 characters

     (20)H — (7F)H 96 characters

     (80)H — (9F)H 32 characters

     (A0)H — (FF)H 96 characters

     Total 256 characters

- Example of pattern data definition ... column #7

	1	2	3	4	5	6	7	8	9	10	11	12
1	.	.	.	.	.	.	.	x	.	.	.	.
2	.	.	.	.	.	.	x	.	x	.	.	.
3	.	.	.	.	.	.	x	.	x	.	.	.
4	.	.	.	.	.	.	x	.	x	.	.	.
5	.	.	.	.	.	.	x	.	x	.	.	.
6	.	.	.	.	.	.	.	x	.	.	.	.
7	.	.	.	.	.	.	.	x	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.

↓

row	data	weight	value
1	.	128	0
2	x	64	64
3	x	32	32
4	x	16	16
5	x	8	8
6	.	4	0
7	.	2	0
8	.	1	0
			120

= pattern data for column #7

- If less than 256 characters are to be defined, all character locations (address) must be consecutive from the starting character.
- Downloading data to one code position does not affect any other code position that has already been loaded.
- Since the DLL character reside in volatile RAM, they are not saved when power is turned off.
- This command initiates printing action (print block).
- DLL characters can be combined with most print features, emphasized, enhanced, double width. For exact combinations, refer to attachments Print Mode/Features Combination Chart.
- The NLQ print feature used in conjunction with this command will cause utility character interpolation printing.
- Changing the “Emulation Mode” setting in MENU mode will cause all stored DLL data to be copied.
- Ascender characters can be defined in rows 1 through 8, and column 1 through 11.
- Ascender characters can be defined in rows 2 through 9, and column 1 through 11.
- When underlining a descender DLL character, the underline occupies the same row as the bottom row of the character.

15) Custom font—create char pattern—UTL/NLQ DLL

(a) Code: part 1 part 2 part 2’

ESC = c1 c2 m n a1 a2 d1 ... d11 a1 a2 d1 ... d11 ...

(b) Compatibility: IBM III

(c) Function:

Define up to 256 character patterns for a 11 H × 8V (UTL), 23 × 8V (NLQ) matrix and store the pattern in RAM.

(d) Range:

- c1 = decimal 0 – 255
- c2 = decimal 0 – 13
- m = decimal 20 or 21
- n = decimal 0 – 255
- a1 = decimal 0 – 255 (see a1’s bit definition below)
- a2 = decimal 0 – 255 (see a2’s bit definition below)
- d1 = decimal 0 – 255
- d11 = decimal 0 – 255

(d) Variable purpose:

- c1 = Low byte of total data count.
- c2 = High byte of total data count.
- m = print ID, selects print quality i.e. 20 = UTL or 21 = NLQ II/Alternate NLQ II
- n = starting character (address) to be redefined by the user.

- a1 = Attribute #1's bit definition (bits 7 – 0)...

  b7 = 0 = ascender, dot rows 1 – 8

  1 = descender, dot rows 2 – 9

  b6 – b2 = ignored

  — Utility DLL (b1 – b0):

  b1 – b0 = 00 = No 12-high expansion. Bit 7 is valid.

  01 = Line graphics char. Bottom dot will be expanded down to rows 9, 10, & 12. Bit 7 is ignored. NLQ used in conjunction with this command will cause vertical, horizontal, and diagonal line enhanced.

  10 = Shading character. The bottom dots in col 1, 2, 3 & 4 will be expande downward to rows 9, 10, 11 & 12.
  NLQ is ignored.

  11 = NUL is expanded 4 dots downward. Bit 7 of a 1 is ignored.

  — NLQ DLL (b1-b0):

  b1 – b0 = 00 = No 12-high expansion. Bit 7 is valid

  01 = Line graphics char. Bottom dot (15) will be expanded down to rows 17, 19, 21, 23 and dot 16 will be expanded to rows 18, 20, 22, 24. Bit 7 is ignored.

  NLQ used in conjunction with this command will cause vertical, horizontal, and diagonal line enhanced.

  10 = Shading character. The top dots in col 1, 4, 5 & 7 will be expanded downward to rows 17, 19, 21, & 23. Bit 7 is ignored (ascender/descender).

  11 = Same as 01.

  — Utility DLL (b1-b0):

  a2 = Attribute #2's bit definition (bits 7–0)

  b7 = unknown

  b6 – b4 = Interpreted as a binary number. Specifies the left offset of first dot column to be printed. Used to reduce leading white space. Maximum of 7 bytes can be ignored. The count begins with byte #1.

  b3 – b0 = Interpreted as a binary number. Specifies the number of dot columns to be printed (width of the printable dot columns). Each character is followed by a mandatory blank column which can not be eliminated. This bank column is not included in the character width. Specified widths greater than 11 will be interpreted as 11 (max. value).

  — NLQ DLL (b1 – b0): reserved

  d1–d11 = column data, each column of data = 1 byte

  Column #1 = byte #1.

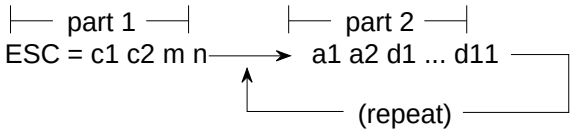
  UTL's 12th column data always = blank

  NLQ's 24th column data always = blank

  NLQ's MSB = top pin, adjacent dots are not allowed.

(e) Additional details:

- This command is composed of 2 parts ...



Part 1, which is “ESC = c1 c2 m n” is only sent once, while part 2, “a1 a2 d1 ... d11” is repeated for each character pattern that is desired to be defined.

UTL NLQ’s Part 2 = 13 (2 + 11) bytes of data

NLQ NLQ’s Part 2 = 48 (2 + 46) bytes of data

- c1 and c2 define the number of bytes (a1, a2, d1-d11), of the characters pattern, to download:

Total count = (# of characters*13) + 2

c2 = total count/256 with no remainder

c1 = remainder

ex: total count = (94*13) + 2 = 1224

1224/256 = 4 200/256

c1 = 200

c2 = 4

- If less than 256 characters are to be defined, all character locations (address) must be consecutive from the starting character.
- Downloading data to one code position does not affect any other code position that has already been loaded.
- Since the DLL characters reside in volatile RAM, they are not saved when power is turned off.
- This command initiates printing action (print block).
- To clear the DLL RAM area, send only Part 1 of the command with

ASCII..... ESC = NUL NUL

Hex..... 1B 3D 00 00

Decimal .. 27 61 0 0

- Changing the emulation mode in MENU will cause stored DLL data to be erased.
- 256 DLL characters location (00) H—(FF)H, can be defined by the user.

16) Custom font—select DLL font

(a) Code: ESC % n

(b) Compatibility: EPS FX

(c) Function:

Select the user-defined font.

(d) Range:

- When n = 01H, 31H, 81H, B1H, the DLL character set will be selected.

n = 00H, 30H, 80H, B0H the DLL character set mode will be reset and the Pre-defined character set will be selected.

(e) Out of range:

- If n does not equal the above values this command is ignored.

17) Character pitch—select 10 CPI

(a) Code: ESC P

(b) Compatibility: EPS FX

(c) Function:

10 CPI, 12 CPI, or 15 CPI mode: 10 characters per inch

15 CPI, (comdense suppress), 17.1 CPI, or 20 CPI mode: 17.1 characters per inch

(d) Additional details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- 10 CPI is the factory default for character pitch.
- This commands will not cancel double width mode.
- 10 CPI and compress = 17.1 CPI.

18) Character pitch—select 10 CPI

(a) Code: DC2

(b) Compatibility: IBM III

(c) Function:

Select 10 CPI character pitch which positions each dot column of the character 1/120 inch apart.

(d) Additional details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- This command will not cancel the double width mode.

19) Character pitch—select 12 CPI

(a) Code: ESC M

(b) Compatibility: EPS FX

(c) Function:

10 CPI, 12 CPI, or 15 CPI mode: 12 characters per inch

15 CPI (comdense suppress), 17.1 CPI, or 20 CPI mode: 20 characters per inch

(d) Additional details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- This command does not cancel double width.
- In the compress mode, 20 CPI is selected.

20) Character pitch—select 12 CPI

(a) Code: ESC

(b) Compatibility: IBM III

(c) Function:

10 CPI, 12 CPI, or 15 CPI mode: 12 characters per inch

17.1 CPI or 20 CPI mode: 12 or 20 characters per inch (in accordance with the “SI Select Pitch (12 CPI)” setting in MENU mode)

(d) Additional details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- Printing does not start if ESC : is received during 12 CPI.
- Character pitch commands become effective immediately upon receipt, thereby, allowing a pitch change within a line.
- This command will not cancel the double width mode.

21) Character pitch—select 15 CPI

(a) Code: ESC g

(b) Compatibility: EPS FX / IBM III / ML

(c) Function:

Selects 15 characters per inch (15CPI).

<Epson>

10 CPI mode:	15 CPI
12 CPI mode:	15 CPI
15 CPI mode:	15 CPI
15 CPI (comdense suppress) mode:	15 CPI (condense suppress)
17.1 CPI mode:	15 CPI (condense suppress)
20CPI mode:	15 CPI (condense suppress)

<IBM> <ML>

10 CPI mode:	15 CPI
12 CPI mode:	15 CPI
15 CPI mode:	15 CPI
17.1 CPI mode:	15 CPI
20 CPI mode:	15 CPI

(d) Additional details:

- This command does not clear the elongated character mode (double width printed character). (Epson, IBM)
- This command clears elongated character mode. (ML)
- This command does not start printing.

22) Character pitch—select condensed (17, 20 CPI)

(a) Code: SI

(b) Compatibility: EPS FX/IBM III

(c) Function:

Compress the current character pitch.

<Epson>

When the printer receives this command in the following CPI modes, the command sets the character pitch as given below.

10 CPI mode:	17.1 CPI
12 CPI mode:	20 CPI
15 CPI mode:	15 CPI (condense suppress)
15 CPI (condense suppress) mode:	15 CPI (condense suppress)
17.1 CPI mode:	17.1 CPI
20 CPI mode:	20 CPI

<IBM>

When the printer receives this command in the following CPI modes, the comand sets the character pitch as given below (in accordance with the “SI Select Pitch (10 CPI)” and “SI Select Pitch (12 CPI)” settings in MENU mode).

10 CPI mode:	15 or 17.1 CPI
12 CPI mode:	12 or 20 CPI
15 CPI mode:	15 or 17.1 CPI
17.1 CPI mode:	15 or 17.1 CPI
20 CPI mode:	15, 17, or 20 CPI

(d) Additional details:

- This command does not cancel double width.

(e) Related functions:

- ESC SI and SI are identical function.

23) Character pitch—select condensed (17, 20 CPI)

(a) Code: ESC SI

(b) Compatibility: EPS FX

(c) Function:

Compress the current character pitch.

10 CPI mode:	17.1 CPI
12 CPI mode:	20 CPI
15 CPI mode:	15 CPI (condense suppress)
15 CPI (comdense suppress) mode:	15 CPI (condense suppress)
17.1 CPI mode:	17.1 CPI
20 CPI mode:	20 CPI

(d) Additional details:

- This command is identical to ESC SI.
- This command does not cancel double width.

(e) Related functions:

- ESC SI and SI are identical in function.

24) Character pitch—cancel condensed (17, 20 CPI)

(a) Code: DC2

(b) Compatibility: EPS FX

(c) Function:

- Cancels condensed pitch, returns pitch to the pitch that was selected before the condensed pitch was activated.

10CPI mode:	10 CPI
12CPI mode:	12 CPI
15CPI mode:	15 CPI
15CPI (comdense suppress) mode:	15 CPI
17.1CPI mode:	10 CPI
20CPI mode:	12 CPI

25) Character pitch—select 10 CPI

(a) Code: RS

(b) Compatibility: ML

(c) Function:

Select 10 CPI (120 DPI) character pitch.

(d) Details

- Since all charcter pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- 10 CPI is the factory default for character pitch.
- This command cancels double width mode.
- When character pitch (CPI) is changed, the printer will change the character pitch of the printing block data when it receives the next print data, and will print the data in the printer buffer.
- Pitch changes are allowed anywhere on the print line.

26) Character pitch—select 12 CPI

(a) Code: FS

(b) Compatibility: ML

(c) Function:

Select 12 CPI (144 DPI) character pitch.

(d) Details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- This command cancels double width.
- When character pitch (CPI) is changed, the printer will change the character pitch of the printing block data when it receives the next print data, and will print the data in the printer buffer.
- Pitch changes are allowed anywhere on the print line.

27) Character pitch—select 17.1 CPI

(a) Code: GS

(b) Compatibility: ML

(c) Function:

Select 17.1 CPI (206 DPI) character pitch.

(d) Details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- This command cancels double width.
- If the printer is in 17.1 CPI (206 DPI) previous to entering Bit Image Graphics will be 60 DPI (10 CPI).
- When character pitch (CPI) is changed, the printer will change the character pitch of the printing block data when it receives the next print data, and will print the data in the print buffer.
- Pitch changes are allowed anywhere on the print line.

28) Character pitch—select 20 CPI

(a) Code: ESC # 3

(b) Compatibility: ML

(c) Function:

Select 20 CPI (144 DPI) character pitch.

(d) Details:

- Since all character pitches are mutually exclusive, this pitch will be “turned-off” if another pitch command is received.
- This command and cancels double width.
- If the printer is in 20 CPI (240 DPI) previous to entering Bit Image Graphics, the resultant density in Bits Image Graphics will be 60 DPI (10 CPI).
- When character pitch (CPI) is changed, the printer will change the character pitch of the printing block data when it receives the next print data, and will print the data in the printer buffer.
- Pitch changes are allowed anywhere on the print line.

29) Character density—define inter-char clearance—by dot column

(a) Code: ESC N n

(b) Compatibility: ML

(c) Function:

Define the number of blank dot columns (n) to be added on to the end of the normal character cell matrix.

(d) Range:

Decimal	Hexadecimal
n = 0 – 11	00 – 0B

(e) Out of range:

The command will be ignored.

(f) Details:

- If the double width print feature is specified while this command is active, the number of additional blank dot columns will be doubled.

  Example: Normal Width (9 + 3) + 5 = 17 columns.

  Double Width (9 + 3 + 5) × 2 = 34 columns.

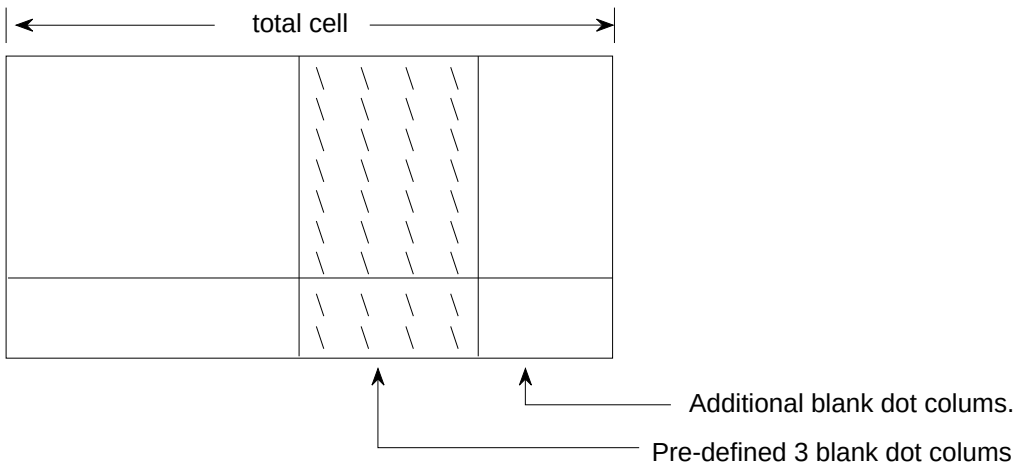
- This command is not effective in the following print modes:

  — Bit Image Graphics.

  — HSD

Note: Refer to the illustration attachments for further details.

- The normal character cell matrix has 3 blank dot columns that are pre-defined and cannot be changed by the user. The additional blank dot columns defined by this command are added to this normal cell.



Example:

	Normal Cell		Additional Blank Columns		Total Cell
1. n = 0	(9 + 3)	+	0	=	12
2. n = 5	(9 + 3)	+	5	=	17

- This command remains in effect until one of the following commands are received.

  — Next ESC.N.n command.

  — CAN

  — ESC CAN

  — I-Prime

- This command is effective in both the Utility Mode and NLQ mode. Any value of "n" will produce the same physical amount of trailing white space after the characters for both NLQ and UTL.

- Pre-defined (default) inter-char clearance is as follows:

  3/120 inch for 10 CPI

3/144 inch for 12 CPI

3/180 inch for 15 CPI

3/206 inch for 17.1 CPI

3/240 for 20 CPI

- Maximum inter character clearance:

  n = 11 (max. value)

  14/120 inch for 10 CPI

  14/144 inch for 12 CPI

  14/180 inch for 15 CPI

  14/206 inch for 17.1 CPI

  14/240 inch for 20 CPI

30) Character pitch select—20 CPI

(a) Code: ESC SI

(b) Compatibility: IBM III

(c) Function:

Selects 20 characters per inch (20 CPI).

(d) Additional details

- This command does not clear the elongated character mode (double width printed character).
- This command does not start printing.

31) Inter-character clearance—define amount—by dot column

(a) Code: ESC SP n

(b) Compatibility: EPS FX

(c) Function:

Defines the number of blank dot columns to add to the right side of each character.

(d) Range:

- Range n = 0 to 255 (Bit 7 of n is ignored.)

(e) Additional details:

- n is the number of dots to be added to the right of each character.
- In double width, the value of clearance will be automatically double. An example is 1 dot column is added to the right side of a normal size character, while double width is activated, the 1 dot column will be doubled.
- Dots width of clearance is:

  10 CPI $\rightarrow$ 1/120”

  12 CPI $\rightarrow$ 1/144”

  15 CPI $\rightarrow$ 1/180”

  17 CPI $\rightarrow$ 1/206”

  20 CPI $\rightarrow$ 1/240”

- Once set, the clearance does not change until reset.

- The command to set clearance between characters is executed immediately upon recognition by the printer.
- This command is not effective for Graphics modes.

32) Inter-character clearance—define amount—by dot column

(a) Code: ESC V n

(b) Compatibility: IBM III

(c) Function:

Defines the number of blank dot columns to add to the right side of each character.

(d) Range:

- $0 \leqq n \leqq 11$

(e) Out of range:

- If n > 11 is specified, n will be truncated to 11. Any value of n > 11 will be truncated.

(f) Additional details:

- Once set, the clearance does not change until reset.
- The command to set clearance between characters is executed immediately upon recognition by the printer.
- The pre-defined character cell matrix has 3 blank dot columns as part of the character option. Using this command only additional blank dot columns can be added to the character.
- This command is not effective for Graphics modes.

33) Character cell size—proportional width—ON / OFF

(a) Code: ESC p n

(b) Compatibility: EPS FX

(c) Function:

Turns on/off the proportional character pitch in which each character has a different cell width in order to unify the “white space” between characters.

(d) Range:

- Range n = 01H, 31H, 81H, or B1H Proportional Spacing = On
- Range n = 00H, 30H, 80H, or B0H Proportional Spacing = Off

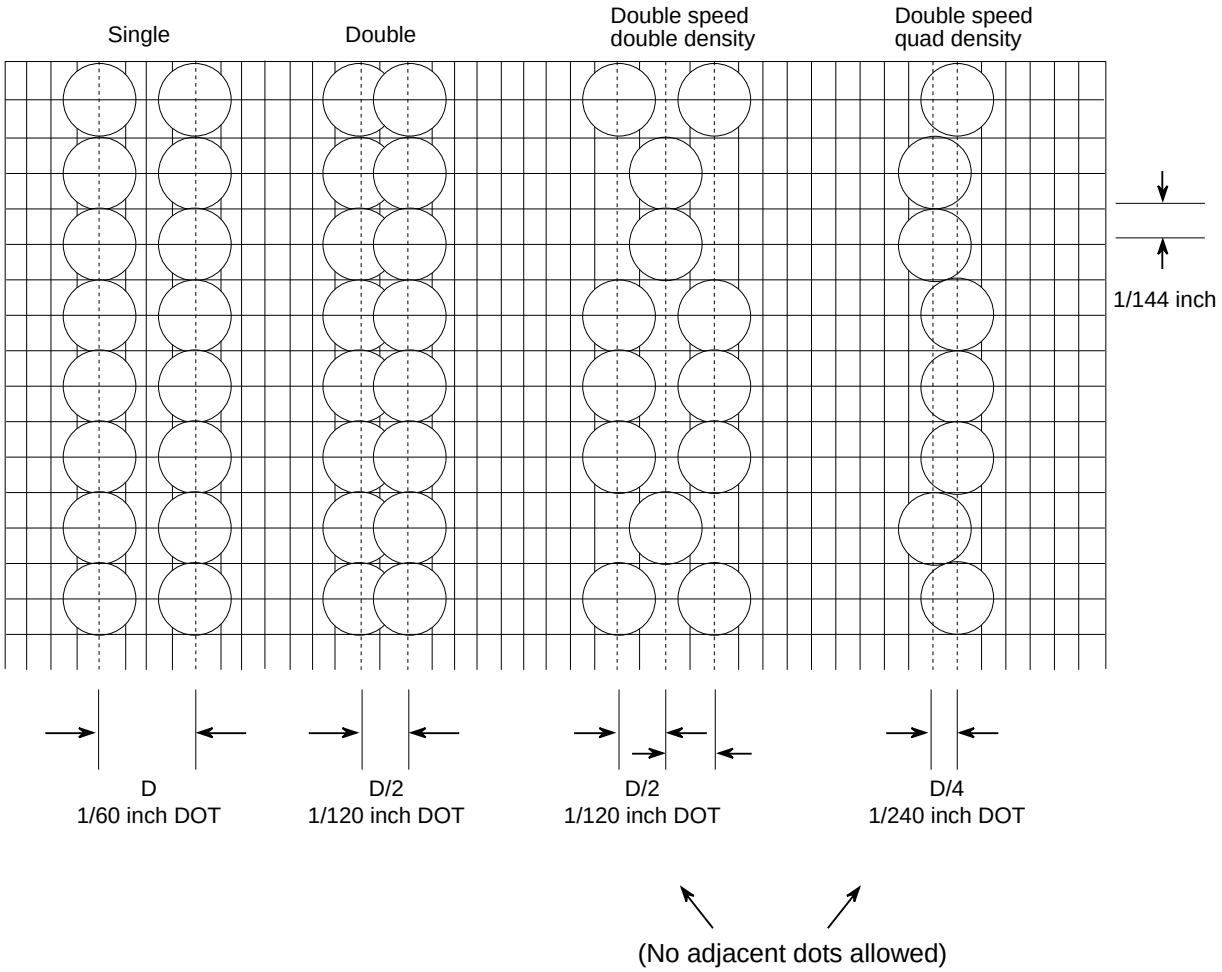
(e) Out of range:

- If n does not equal the above values this command is ignored.

(f) Additional details:

- Previous print mode (print quality and pitch) will be maintained.
- Proportional spacing can also be designated by ESC ! n, the Master select command. Proportional spacing set by ESC ! n can be reset by ESC p 0.
- “See attachments for Proportional width table”.

APPENDIX A
BIT IMAGE GRAPH IS — DOT DENSITY



D = 1/60 inch

APPENDIX B
PRINT MODES/FEATURES COMBINATION PRIORITY TABLE

IBM Mode:

Priority		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI	Proprotional Print	Firstfont	Line graphics	Superscript/subscript	HSD-ROM	SSD-ROM	UTL-ROM/RAM	NLQ-ROM/RAM	Scalable	Italics	Emphasized printing (horizontal)	Enhanced (double strike)	Double width	Double height	Overscore	Inter-character clearance
1	10 CPI		–	–	–	–	–	–				▲			–							
	12 CPI	–		–	–	–	–	–							–							
	15 CPI	–	–		–	–	–	–				▲			–							
	17.1 CPI	–	–	–		–	–	–				▲			–							
	20 CPI	–	–	–	–		–	–				▲			–							
	Proprotional Print	–	–	–	–	–		–			×	×			–							
	Firstfont	–	–	–	–	–	–				–	–	–	–	×							×
2	Line graphics									×						×					×	
3	Superscript/subscript								×													
4	HSD-ROM						×	–				–	–	–	×							×
	SSD-ROM	▲		▲	▲	▲	×	–			–		–	–	×							×
	UTL-ROM/RAM							–			–	–		–	×							
	NLQ-ROM/RAM							–			–	–	–									
5	Scalable	–	–	–	–	–	–	×			×	×	×			×	×	×	–	–		–
6	Italics								×						×							
7	Emphasized print (horizontal)														×							
	Enhanced (double strike)														×							
	Double width														–							
	Double height														–							
	Overscore								×													
	Inter-character clearance							×			×	×			–							

– : No combination of model feature
× : Combination of model/feature disabled. The mode/feature with a lower priority level is suppressed.
▲ : SSD is suppressed and HSD is printed.
Blank : Combination of model/feature enabled.

Note 1: The integral (F4H, F5H) character does not modify the following items

Superscript/subscript

Italics

Overscore

Note 2: The underline (5FH) and double-underline (Multi-lingual F2H) characters do not modify the following items.

Superscript/subscript

Note 3: Inter-character clearance can be added to the first font RAM CG feature.

Note 4: The enhanced (double strike) feature includes emphasized printing.

EPSON Mode:

	Priority	1						2	3	4				5	6	7					
Priority		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI	Proprotional Print	Line graphics	Superscript/subscript	HSD-ROM	SSD-ROM	UTL-ROM/RAM	NLQ-ROM/RAM	Scalable	Italics	Emphasized printing (horizontal)	Enhanced (double strike)	Double width	Double height	Overscore	Inter-character clearance
1	10 CPI		–	–	–	–	–				▲			–							
	12 CPI	–		–	–	–	–							–							
	15 CPI	–	–		–	–	–				▲			–							
	17.1 CPI	–	–	–		–	–				▲			–							
	20 CPI	–	–	–	–		–				▲			–							
	Proprotional Print	–	–	–	–	–				×	×			–							
2	Line graphics								×						×					×	
3	Superscript/subscript							×													
4	HSD-ROM						×				–	–	–	×							×
	SSD-ROM	▲		▲	▲	▲	×			–		–	–	×							×
	UTL-ROM/RAM									–	–		–	×							
	NLQ-ROM/RAM									–	–	–									
5	Scalable	–	–	–	–	–	–			×	×	×			×	×	×	–	–		–
6	Italics							×						×							
7	Emphasized printing (horizontal)													×							
	Enhanced (double strike)													×							
	Double width													–							
	Double height													–							
	Overscore							×													
	Inter-character clearance									×	×			–							

– : No combination of model feature
× : Combination of model/feature disabled. The mode/feature with a lower priority level is suppressed.
▲ : SSD is suppressed and HSD is printed.
Blank : Combination of model/feature enabled.

Note 1: The integral (F4H, F5H) character does not modify the following items

Superscript/subscript

Italics

Overscore

Note 2: The underline (5FH) and double-underline (Multi-lingual F2H) characters do not modify the following items.

Superscript/subscript

Note 3: The line graphics feature with RAM CG feature combination is disabled.(RAM CG feature has priority.)

Note 4: The enhanced (double strike) feature includes emphasized printing.

ML Mode:

	Priority	1					2	3		4	5				6	7	8					
Priority		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI	Proprotional Printing	Line graphics	Blocks graphics	Superscript/subscript	HSD-ROM	SSD-ROM	UTL-ROM/RAM	NLQ-ROM/RAM	Scalable	Italics	Emphasized printing (horizontal)	Enhanced (double strike)	Double width	Double height	Underline	Inter-character clearance
1	10 CPI		–	–	–	–						▲			–							
	12 CPI	–		–	–	–									–							
	15 CPI	–	–		–	–						▲			–							
	17.1 CPI	–	–	–		–						▲			–							
	20 CPI	–	–	–	–							▲			–							
2	Proprotional Printing										×	×			–							
3	Line graphics									×						×					×	
	Blocks graphics																					
4	Superscript/subscript							×														
5	HSD-ROM						×					–	–	–	×							×
	SSD-ROM	▲		▲	▲	▲	×				–		–	–	×							×
	UTL-ROM/RAM										–	–		–	×							
	NLQ-ROM/RAM										–	–	–									
6	Scalable	–	–	–	–	–	–				×	×	×			×	×	×	–	–		–
7	Italics							×							×							
8	Emphasized printing (horizontal)														×							
	Enhanced (double strike)										×	×	×		×							
	Double width														–							
	Double height														–							
	Underline							×														
	Inter-character clearance										×	×			–							

– : No combination of model feature
× : Combination of model/feature disabled. The mode/feature with a lower priority level is suppressed.
▲ : SSD is suppressed and HSD is printed.
Blank : Combination of model/feature enabled.

Note 1: The integral (F4H, F5H) character does not modify the following items

Superscript/subscript

Italics

Overscore

Note 2: The underline (5FH) and double-underline (Multi-lingual F2H) characters do not modify the following items.

Superscript/subscript

Note 3: The line graphics feature with RAM CG feature combination is disabled.(RAM CG feature has priority.)

Note 4: The enhanced (double strike) feature includes emphasized printing.

APPENDIX C
COMMAND SUMMARY

ASCII Code	Function Name	Compatibility
HORIZONTAL CONTROL		
CR	CARRIAGE RETURN – EXECUTE	EPS FX/IBM III/ML
BS	BACKSPACE	EPS FX/IBM III/ML
DEL	DELETE	EPS FX
ESC U n	PRINT DIRECTION – SELECT UNI/DIRECTIONAL PRINT	EPS FX/IBM III
ESC <	PRINT DIRECTION- UNIDIRECTIONAL PRINT_ONE LINE ONLY	EPS FX
ESC —	PRINT DIRECTION – UNI–DIRECTIONAL	ML
ESC =	PRINT DIRECTION – BI–DIRECTIONAL	ML
ESC $ n1 n2	PRINT POSITION – EXECUTE PRINT POSITION FROM LEFT MARGIN	EPS FX
ESC % B n1 n2 n3 n4	PRINT POSITION–DEFINE PRINT POSITION FROM LEFT MARGIN	IBM III/ML
ESC % B n1 n2 n3 n4	PRINT POSITION	ML
ESC % F n1 n2 n3 n4	PRINT POSITION	ML
ESC \ n1 n2	PRINT POSITION – DEFINE INDEXED POSITION – BY DOT COLUMN	EPS FX
ESC \ n1 n2		IBM III
ESC DLE @n A1 A2 P1 P2 P3 P4	SET PRINT POSITION	EPSON FX/ /IBM III/ML
ESC D x1 x2 x3...xk NUL	HORIZONTAL TABS – DEFINE STOPS – BY CHARACTERS	EPS FX/IBM III
HT	HORIZONTAL TAB – EXECUTE	EPS FX/IBM III
ESC R	HORIZONTAL TABS – DEFINE STOPS – DEFAULT VALUES	IBM III
ESC HT X1, Y1 Z1,..., Xm Ym Zm CR	HORIZONTAL TABS – DEFINE STOPS – BY CHARACTERS	ML
ESC ETX X1 Y1 Z1 W1,..., Xm Ym Zm Wm CR	HORIZONTAL TABS – DEFINE STOPS – BY DOT COLUMN	ML
HT	HORIZONTAL TAB – EXECUTE	ML
ESC 1 n	MARGINS – DEFINE LEFT MARGIN	EPS FX
ESC Q n	MARGINS – DEFINE RIGHT MARGIN	EPS FX
ESC X n1 n2	MARGINS – DEFINE LEFT & RIGHT MARGIN	IBM III
ESC a n	PRINT – LINE JUSTIFICATION – SELECT	EPS FX
ESC % C n1 n2 n3	MARGINS – DEFINE LEFT MARGIN	ML
ESC % R n1 n2 n3 n4	MARGINS – RIGHT MARGIN	ML

ASCII Code	Function Name	Compatibility
VERTICAL CONTROL		
ESC 2	LINE SPACING – SELECT FIXED AMOUNT – 1/6 INCH	EPS FX
ESC 6	LINE SPACING – SELECT FIXED AMOUNT – 1/6 INCH	ML
ESC 0	LINE SPACING – SELECT FIXED AMOUNT – 1/8 INCH	EPS FX/IBM III
ESC 8	LINE SPACING – SELECT FIXED AMOUNT – 1/8 INCH	ML
ESC 1	LINE SPACING – SELECT FIXED AMOUNT – 7/72 INCH	EPS FX/IBM III
ESC A n	LINE SPACING – DEFINE AMOUNT – n/72 INCH	IBM III
ESC A n	LINE SPACING – DEFINE AMOUNT – n/72 INCH	EPS FX
ESC 3 n	LINE SPACING – DEFINE AMOUNT – n/216 INCH	EPS FX/IBM III
ESC 2	LINE SPACING – ACTIVATE AMOUNT DEFINED BY n/72 INCH	IBM III
ESCJ n	LINE FEED – EXECUTE AMOUNT – n/216 INCH	EPS FX/IBM III
ESC % 5 n	FINE LF – EXECUTE – n/144 INCH AMOUNT	EPS FX/IBM III/ML
ESC % 9 n1	LINE SPACING – DEFINE AMOUNT – n/144 INCH	EPS FX/IBM III/ML
LF	LINE FEED – EXECUTE FORWARD LF WITH CR	EPS FX/IBM III
ESC j n	LINE FEED – EXECUTE REVERSE LF	EPS FX
ESC]	LINE FEED – EXECUTE REVERSE LF – ONE LINE ONLY	IBM III
LF	LINE FEED – EXECUTE FORWARD LF WITH CR	ML
ESC LF	LINE FEED – EXECUTE REVERSE LINE FEED	ML
ESC 5 n	LINE FEED – AUTOMATIC LF – ON/OFF	IBM III
ESC DC2	LINE FEED – W/O CARRIAGE RETURN	ML
ESC VT n1 n2	LINE FEED – EXECUTE DIRECT SKIP	ML
ESC C nul n	FORM LENGTH – DEFINE AMOUNT – BY INCHES	EPS FX/IBM III
ESC C n	FORM LENGTH – DEFINE AMOUNT – BY LINES	EPS FX/IBM III

ASCII Code	Function Name	Compatibility
ESC G n1 n2	FORM LENGTH – DEFINE AMOUNT – BY 1/2 INCH	ML
ESC F n1 n2	FORM LENGTH – DEFINE AMOUNT – BY LINES	ML
FF	FORM FEED – EXECUTE	EPS FX/IBM III/ML
ESC 5	TOP OF FORM – DEFINE	ML
ESC % S n	MARGIN – DEFINE BOTTOM MARGIN (AUTO SKIP)	ML
ESC 4	TOP OF FORM – DEFINE	IBM III
ESC N n	MARGINS – DEFINE BOTTOM MARGIN (AUTO SKIP)	EPS FX/IBM III
ESC 0	MARGINS – CANCEL BOTTOM MARGIN (AUTO SKIP)	EPS FX/IBM III
ESC / n	VERTICAL TABS – SELECT CHANNEL	EPS FX
ESC B n1 n2...nk NUL	VERTICAL TABS – DEFINE TAB STOPS	EPS FX/IBM III
ESC b n m1 m2... mk NUL	VERTICAL TABS – DEFINE TAB STOPS IN CHANNELS	EPS FX
VT	VERTICAL TAB – EXECUTE	EPS FX/IBM III
DC4 s1...sx n1?	VERTICAL TABS – DEFINE TAB STOPS IN CHANNELS (VFU)	ML
VT n	VERTICAL TABS – EXECUTE	ML
ESC 9	PAPER – OUT SENSOR – ENABLE	EPS FX/IBM III
ESC 8	PAPER – OUT SENSOR – DISABLE	EPS FX/IBM III
ESC E n	PAPER – OUT DETECTION OVERRIDE – ENABLE/DISABLE	ML
ESC EM I	CUT – SHEET FEEDER – SINGLE SHEET INSERT	EPS FX/IBM III
ESC EM R	CUT – SHEET FEEDER – SINGLE SHEET EJECT	EPS FX/IBM III
ESC S	CUT – SHEET FEEDER – SINGLE SHEET INSERT	ML
ESC V	CUT – SHEET FEEDER – SINGLE SHEET EJECT	ML
ESC EM n	CUT – SHEET – FEEDER – DUAL BIN CSF BIN SELECT	ML
ESC EM n	DUAL BIN CSF BIN SELECT	EPS FX/IBM III
ESC DLE H	LINE SPACING SELECT/EXECUTION COMPOUND COMMAND	EPS FX/IBM III/ML

ASCII Code	Function Name	Compatibility
SYMBOL SETS		
ESC 7	IBM CHAR SET I – SELECT	IBM II
ESC 6	IBM CHAR SET II – SELECT	IBM III
ESC\n1 n2	IBM CHAR SET III (ALL CHAR) – CONTINUOUS – SELECT	IBM III
ESC ^	IBM CHAR SET III (ALL CHAR) – PRINT ONE CHAR ONLY	IBM III
ESC ! 0	SYMBOL SET – OKIDATA – STANDARD – SELECT	ML
ESC ! 1	BLOCK GRAPHICS TABLE SELECT	ML
ESC ! 2	SYMBOL SET – OKIDATA – IBM – SELECT	ML
ESC R n	INTERNATIONAL LANGUAGE CHAR SET – SELECT	EPS FX
ESC ! n	INTERNATIONAL LANGUAGE CHARACTER SET –	IBM III/ML
ESC [T Ln Hn NUL NUL Hcp Lcp NUL	SELECT CODE PAGE	IBM III/ML
ESC t n	SLANT/GRAPHICS CHARACTER TABLE – SELECT	ESC FX
ESC I n	EPSON – CONTROL CODES OR PRINTABLE CHARACTERS – ON/OFF	EPS FX
ESC 6	EPSON – CONTROL CODES OR PRINTABLE CHARACTERS – ON	EPS FX
ESC 7	EPSON – CONTROL CODES OR PRINTABLE CHARACTERS – OFF	EPS FX
ESC 4	EPSON – ITALIC CHARACTER SET – SELECT	EPS FX
ESC 5	EPSON – ITALIC CHARACTER SET – CANCEL	EPS FX
ESC (t	EPSON CHARACTER TABLE SELECT	EPS FX
FONT DESCRIPTION		
ESC x n	PRINT QUALITY – SELECT MODE – UTL/NLQ	EPS FX
ESC # 0	PRINT QUALITY – SELECT HSD	IBM III
ESC (n	PRINT QUALITY – SELECT HSD	EPS FX
ESC I n	PRINT QUALITY – SELECT FONT	IBM III
ESC # 0	PRINT QUALITY – SELECT HIGH SPEED DRAFT	ML
ESC 0	PRINT QUALITY – SELECT UTILITY	ML
ESC 1	PRINT QUALITY – SELECT NLQ	ML
ESC 3	PRINT QUALITY – SELECT NLQ – GOTHIC	NL

ASCII Code	Function Name	Compatibility
ESC 2	CUSTOM FONT – SELECT UTL DLL FONT	ML
ESC 7	CUSTOM FONT – SELECT SYNTHETIC – NLQ DLL FONT	ML
ESC k n	TYPESTYLES – SELECT	EPS FX
NUL n NUL	CUSTOM FONT – CREATE – COPY ROM DATA TO RAM	EPS FX
ESC$	CUSTOM FONT – CREATE – COPY ROM DATA TO RAM	IBM III/ML
ESC & m n1 n2 a d1...d11 ad1...d11	CUSTOM FONT – CREATE – CHAR – PATTERN – UTL DLL	EPS FX
ESC = c1 c2 m n a1 a2 d1...d11 a1 a2 d1 ...d11...	CUSTOM FONT – CREATE – CHAR – PATTERN – UTL/NLQ DLL	IBM III
ESC % n	CUSTOM FONT – SELECT DLL FONT	EPS FX
ESC P	CHARACTER PITCH – SELECT 10 CPI	EPS FX
DC2	CHARACTER PITCH – SELECT 10 CPI	IBM III
ESC M	CHARACTER PITCH – SELECT 12 CPI	EPS FX
ESC:	CHARACTER PITCH – SELECT 12 CPI	IBM III
ESC g	CHARACTER PITCH – SELECT 15 CPI	EPSON FX/IBM III/ML
SI	CHARACTER PITCH – SELECT CONDENSED (17, 20 CPI)	EPS FX/IBM III
ESC SI	CHARACTER PITCH – SELECT CONDENSED (17, 20 CPI)	EPS FX
DC2	CHARACTER PITCH – CANCEL CONDENSED (17, 20 CPI)	EPS FX
RS	CHARACTER PITCH – SELECT 10 CPI	ML
FS	CHARACTER PITCH – SELECT 12 CPI	ML
GS	CHARACTER PITCH – SELECT 17.1 CPI	ML
ESC # 3	CHARACTER PITCH – SELECT 20 CPI	ML
ESC N n	CHARACTER DENSITY – DEFINE INTER – CHAR CLEARANCE – BY DOT COLUMN	ML
ESC SI	CHARACTER PITCH SELECT – 20 CPI	IBM III
ESC SP n	INTER – CHARACTER CLEARANCE – DEFINE AMOUNT – BY DOT COLUMN	EPS FX
ESC V n	INTER – CHARACTER CLEARANCE – DEFINE AMOUNT – BY DOT COLUMN	IBM III
ESC p n	CHARACTER CELL SIZE – PROPORTIONAL WIDTH – ON/OFF	EPS FX

ASCII Code	Function Name	Compatibility
ESC P n	CHARACTER CELL SIZE – PROPORTIONAL WIDTH – ON/OFF	IBM III
ESC Y	CHARACTER CELL SIZE – PROPORTIONAL WIDTH – ON	ML
ESC Z	CHARACTER CELL SIZE – PROPORTIONAL WIDTH – OFF	ML
ESC % A m n1...n11	CUSTOM FONT – CREATE PATTERN – UTL DLL – ASCENDER	ML
ESC % D m n1...n11	CUSTOM FONT – CREATE PATTERN – UTL DLL – DESCENDER	ML
ESC X Pn Lp Hp	Select Font by Pitch And Point	EPS FX
ESC DLE F Pro Pn Lp Hp	Select Font by Pitch And Point	IBM III/ML
TEXT PRINT FEATURES		
ESC – n	UNDERLINE – ON/OFF	EPS FX/IBM III
ESC__n	OVERSCORE – ON/OFF	IBM III
ESC C	UNDERLINE – ON	ML
ESC D	UNDERLINE – OFF	ML
ESC E	EMPHASIZED – ON	EPS FX/IBM III
ESC F	EMPHASIZED – OFF	EPS FX/IBM III
ESC G	ENHANCED (DOUBLE STRIKE) – ON	EPS FX/IBM III
ESC T	EMPHASIZE – ON	ML
ESC H	ENHANCED – ON	ML
ESC I	EMPHASIZED AND ENHANCED – OFF	ML
US	DOUBLE WIDE – SELECT	ML
ESC US n	DOUBLE HIGH – SELECT	ML
ESC H	ENHANCED (DOUBLE STRIKE) – OFF	EPS FX/IBM III
ESC W n	DOUBLE WIDE (EXPANDED) – ON/OFF	EPS FX/IBM III
S0	DOUBLE WIDE (EXPANDED) – ONE LINE ONLY – ON	EPS FX/IBM III
ESC SO	DOUBLE WIDE (EXPANDED) – ONE LINE ONLY – ON	EPS FX
DC4	DOUBLE WIDE (EXPANDED) – ONE LINE ONLY – OFF	EPS FX/IBM III
ESC w n	DOUBLE HEIGHT – ON/OFF	EPS FX
ESC [@n1 n2 m1 m2 m3 m4	DOUBLE HEIGHT AND WIDTH – ON/OF	IBM III
ESC S n	SCRIPT – SUPER/SUB – SELECT	EPS FX/IBM III
ESC T	SCRIPTS – SUPER/SUB – CANCEL	EPS FX/IBM III
ESC L	SUBSCRIPTS – ON	ML

ASCII Code	Function Name	Compatibility
ESC M	SUBSCRIPTS – OF	ML
ESC J	SUPERSCRIPT – ON	ML
ESC K	SUPERSCRIPT – OFF	ML
ESC % G	SLANT – ON	IBM III
ESC % H	SLANT – OFF	IBM III
ESC!/	SLANT – ON	ML
ESC!*	SLANT – OFF	ML
GRAPHICS MODE		
ESC*m n1 n2 (GRAPHICS DATA)	BIT IMAGE GRAPHICS – SELECT DENSITY AND ENTER GRAPHICS	EPS FX
ESC^m n1 n2	BIT IMAGE GRAPHICS – SELECT 9 PIN MODE	EPS FX
ESC? m n	BIT IMAGE GRAPHICS – REASSIGN GRAPHIC'S DENSITY COMMANDS	EPS FX
ESC K n1 n2 (GRAPHICS DATA)	BIT IMAGE GRAPHICS – DOUBLE HORIZONTAL DENSITY	EPS FX/IBM III
ESC L n1 n2 (GRAPHICS DATA)	BIT IMAGE GRAPHICS – DOUBLE HORIZONTAL DENSITY – NORMAL SPEED	EPS FX/IBM III
ESC Y n1 n2 (GRAPHICS DATA)	BIT IMAGE GRAPHICS – DOUBLE HORZ DENSITY – HIGH SPEED	EPS FX/IBM III
ESC Z n1 n2 (GRAPHICS DATA)	BIT IMAGE GRAPHICS – QUADRUPLE HORIZONTAL DENSITY	EPS FX/IBM III
ETX	BIT IMAGE GRAPHICS – ENTER	ML
ETX STX	BIT IMAGE GRAPHICS – EXIT	ML
ESC P	BIT IMAGE GRAPHICS – TRUE SINGLE HORZ DENSITY – ESC Q	ML
ESC Q	BIT IMAGE GRAPHICS – TRUE SINGLE HORZ DENSITY – ESC Q	ML
ESC R	BIT IMAGE GRAPHICS – TRUE DOUBLE HORZ DENSITY	ML
ESC#Q	BIT IMAGE GRAPHICS – DOUBLE SPEED QUASI QUADRUPLE HORZ DENSITY	ML
ETX LF	BIT IMAGE GRAPHICS – EXECUTE LF W/CR – TEXT AMOUNT	ML
ETX DC2	BIT IMAGE GRAPHICS – EXECUTE LF W/O CR – TEXT AMOUNT	ML

ASCII Code	Function Name	Compatibility
ETX SO	BIT IMAGE GRAPHICS – EXECUTE LF W/CR – GRAPHICS AMOUNT	ML
ETX DC4	BIT IMAGE GRAPHICS – EXECUTE LF W/O CR – GRAPHICS AMOUNT	ML
COMPOSITE COMMANDS		
ESC!n	COMPOSITE COMMANDS – SELECT PRINT FEATURES AND PITCH	EPS FX
ESC & n1 n2 n3 n4:	SELECT PRINT MODES AND FEATURES	ML
ESC * n :	BIT IMAGE GRAPHICS MODES AND FEATURES	ML
ESC ? n :	CARRIAGE RETURN AND LINE FEED CONTROL	ML
GENERAL CONTROL		
CAN	RESET – CLEAR PRINT BUFFER	PS FX/IBM III
ESC @	RESET – CLEAR BUFFER AND INITIALIZE PRINTER	EPS FX
ESC >	MSB CONTROL – SET MSB EQUAL TO 1	EPS FX
ESC =	MSB CONTROL – SET MSB EQUAL TO 0	EPS FX
ESC #	MSB CONTROL – CANCEL MSB CONTROL	EPS FX
DC3	PRINT SUPPRESS – ON	EPS FX
ESC Q ETX	PRINT SUPPRESS – ON	IBM III
ESC Q SYN	PRINT SUPPRESS – ON	IBM III
DC1	PRINT SUPPRESS – OFF	EPS FX/IBM III
ESC s n	PRINT SPEED – HALF – ON/OFF	EPS FX
CAN	RESET – CLEAR PRINT BUFFER	ML
ESC CAN	RESET – PRINT DATA AND INITIALIZE PRINTER	ML
DC3	PRINT SUPPRESS – ON	ML
DC1	PRINT SUPPRESS – OFF	ML
ESC <	PRINT SPEED – HALF	ML
ESC >	PRINT SPEED – FULL	ML
ESC j	STOP PRINT	IBM III
ESC { N	EMULATION MODE SWITCHING	EPS FX/IBM III/ML

ASCII Code	Function Name	Compatibility
ESC } NUL	PRINTER INITIALIZATION	EPS FX/IBM III/ML
ESC [K Ln Hn Init Id Parm 1 Parm 2	SET INITIAL CONDITION	IBM III
ESC i	INCREMENTAL PRINT SELECT	EPS FX/IBM III/ML
BARCODE		
ESC DLE A P1 N1 N2 N3 N4 N5 N6 N7 N8	SELECT BARCODE	EPS FX/IBM III/ML
ESC DLE B P1 Pm[DATA]	PRINT BARCODE DATA	EPS FX/IBM III/ML
ESC DLE C P1 [DATA]	PRINT POSTNET BARCODE DATA	EPS FX/IBM III/ML

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